FOOD Manufacture

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Vol. 36 No. 10 OCTOBER 1961

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90 tumbles in Bowaters 'Tappi' Drum test prove **SCOTCH** Brand Filament tape the best reinforcement for cartons

This carton, reinforced with conventional strapping, has burst, exposing its contents to further damage and opportunity for pilfering.

An identical carton, to which 'SCOTCH' Brand Filament Tape has been applied as reinforcement, remains intact.

The extraordinary tensile strength and shock-absorbing qualities of 'SCOTCH' Brand Filament Tape have been proved by Bowaters rigorous 'Tappi' Drum Test.

Two identical cartons—one sealed by conventional strapping, the other by Filament Tape—were subjected to 90 tumbles in the 'Tappi' Drum, a large revolving drum in which articles under test are tossed and tumbled to simulate rough-handling received in transit. Following this, each carton was dropped three times on different corners from a height of 3 feet.

The results of these tests, seen above, show beyond doubt that Filament Tape has the strength and resilience to withstand the roughest treatment. What they do not show are the qualities of easy handling, quick application, safety, easy disposal, lightness and economy which emphasise that 'SCOTCH' Brand Filament Tape is the modern way to reinforce cartons of almost every description.

No. 880 'SCOTCH' Brand Rayon Filament Tape and No. 898 'SCOTCH' Brand Glass Filament Tape are two of a wide range of 'SCOTCH' Brand Tapes for Industry.

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*** Choose from a complete range of food processing machinery.**

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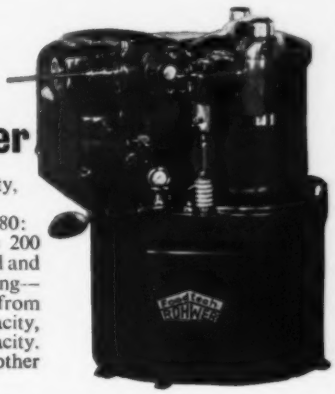

Model A.1: 60 lb. capacity, 120 sausages per minute. Straight filling too! A.L. 80: 176 lb. capacity. Up to 200 sausages per minute linked and weighed also straight filling—air, water or hydraulic—from 100 lb. to 440 lb. capacity, A.L.200: 440 lb capacity. Also available in many other sizes.

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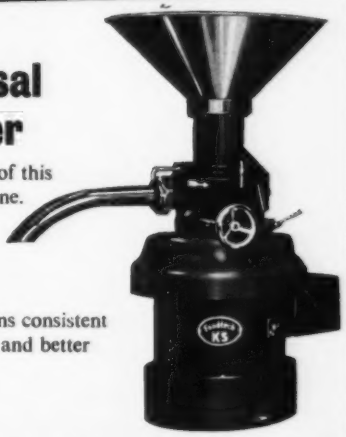

Over 200 satisfied users of this machine in the U.K. alone. Accepts all foodstuffs—even the toughest—and reduces in seconds to a smooth uniform mix that remains consistent for more binding power and better colour.

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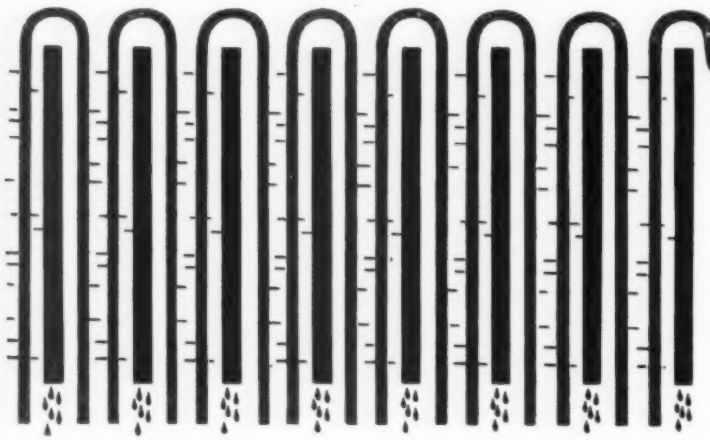

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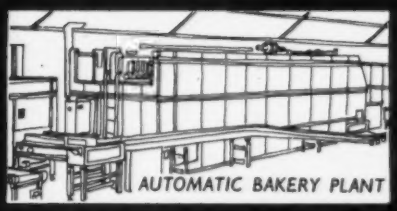
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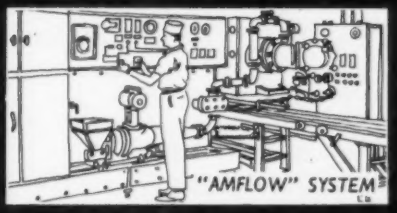
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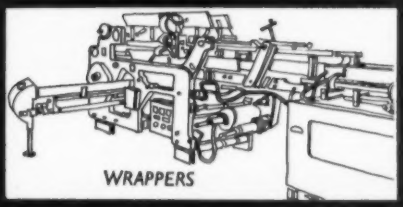
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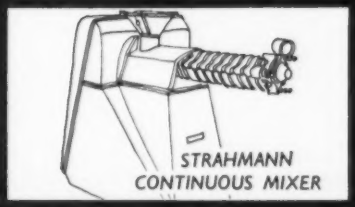
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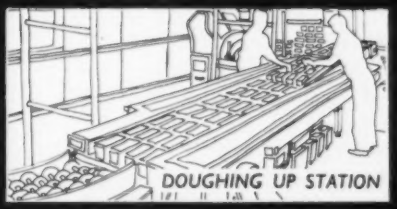
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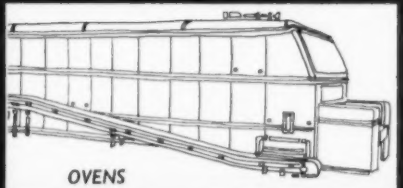
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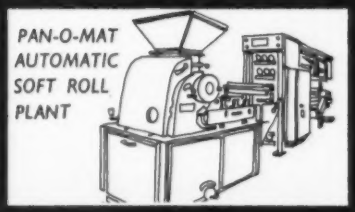

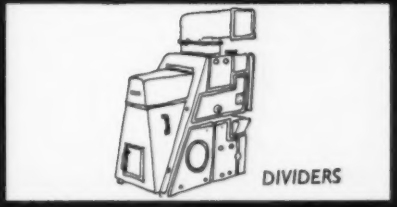
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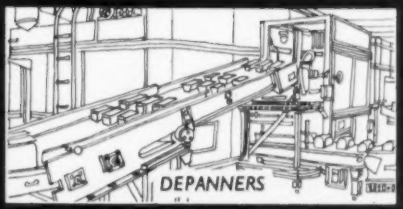
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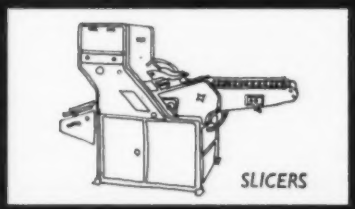
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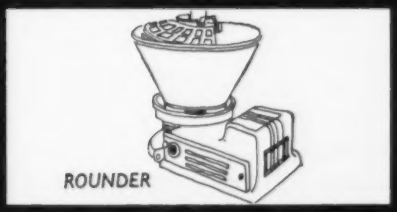
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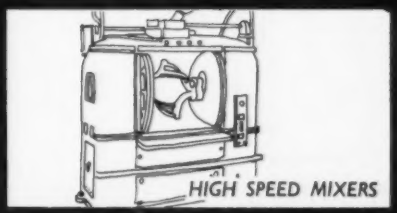
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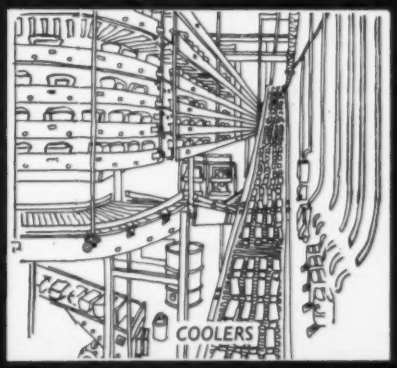
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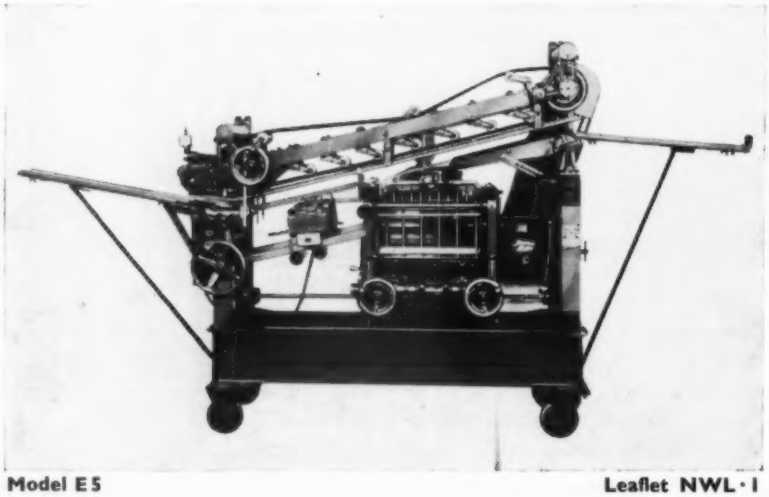

Model E5 — Leaflet NWL·1

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'E5. CAN LABELLER'
JUST ONE from our wide range of semi and fully automatic
LABELLING MACHINES

This heavy duty "NEW-WAY" model E5. straight through can labeller incorporates a new elevating feature with high discharge point that in many cases permits direct gravity feed to the "caser".

Handles tin, glass, fibre or other cylindrical containers from 108 to 502 (1½" to 5½") diameter by 112 to 708 (1¾" to 7½") in height, without use of change parts. Change from one size to another taking only 2 minutes. Other features include: infinitely variable speed drive, 2kW gum pot heater with accurate thermostatic control, also simple and positive regulation of the lap paste.

It will handle up to 500 or more containers per minute, with equal facility, depending on size of can and consistency of feed. The label magazine holds 3,000 labels and can be refilled without stopping the machine.

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JACW/H/23

A SMALL WORD ON A PACK MAY SHOW A BIG CHANGE IN PUBLIC TASTE

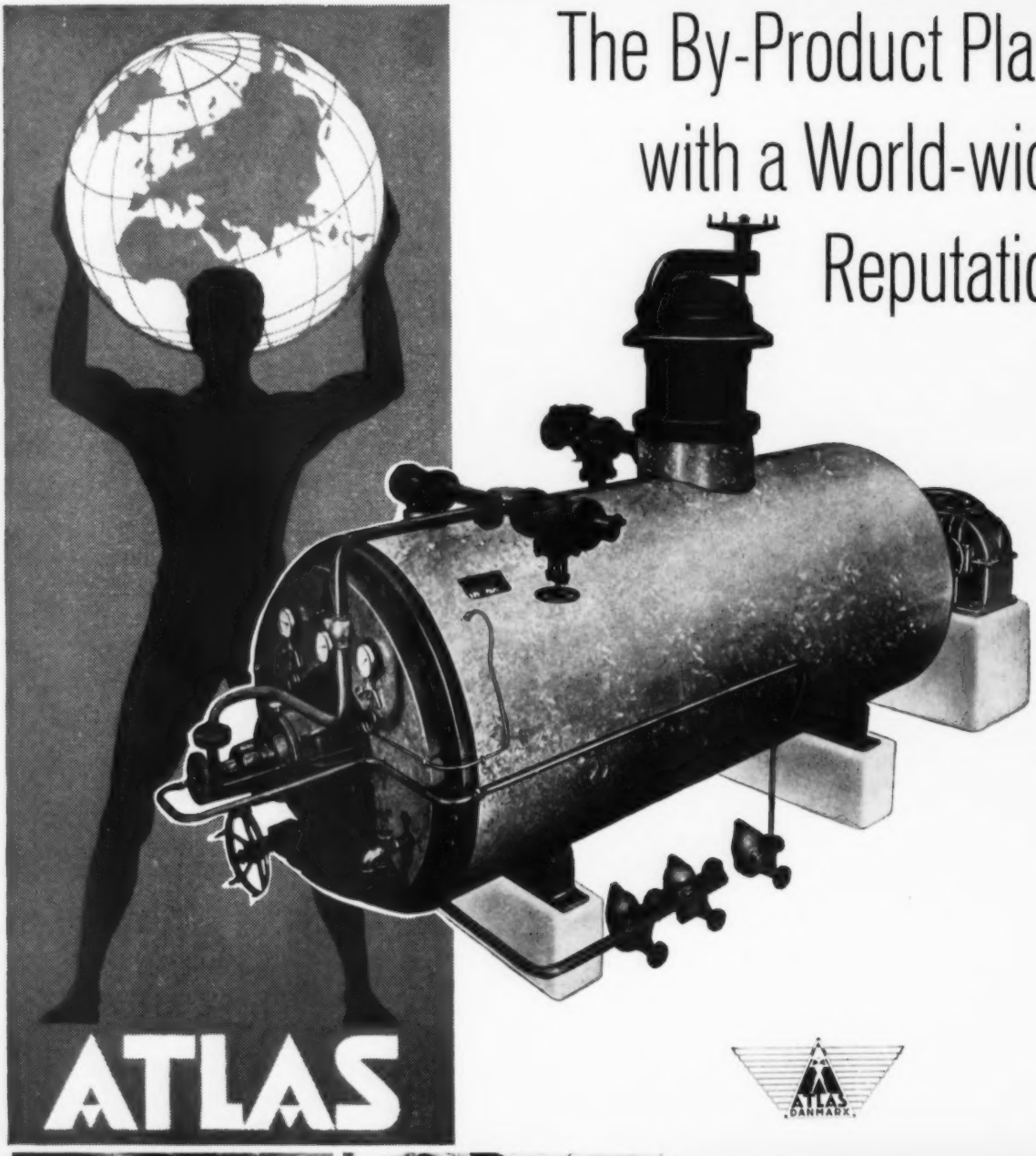
Haven's Demerara Sugar is their biggest packaged line. There's nothing airy-fairy about it—nothing aimed at the richer end of the market. Yet just recently Haven have thought it worth their while to make a small but significant change on the pack. In the recipes on the back panel they now specify butter—the real thing instead of just a substitute.

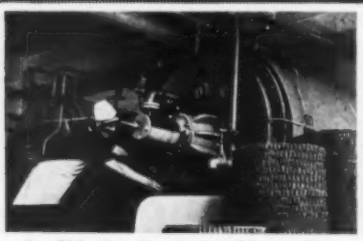
This "butter" policy is now reflected in all Haven's recipe material, both on their packs and in their leaflets. For, like many other manufacturers today, Haven realise that a recipe made with butter shows off their product at its very best.

If you're not already recommending butter in your recipes, it is worth thinking about. You'll find that "butter" *pays*.

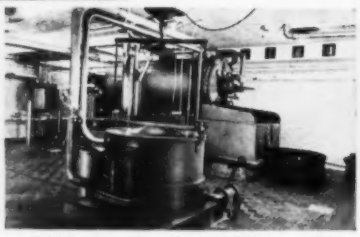
Issued by the Butter Information Council MERCURY HOUSE, WATERLOO ROAD, LONDON S.E.1 Telephone: WATerloo 5321

The By-Product Plant with a World-wide Reputation





Inedible Dry Rendering Plants. For Processing: Condemned Carcasses Dead Animals, Bones, Butcher Scrap.



Edible Dry Rendering Plants. For Processing: Caul and ruffle fats in Beef and Lambs, clean fatty trimmings from Viscera, leaf and back fats in Hogs, edible cuts of meats, green bones.

DRY RENDERING COOKER

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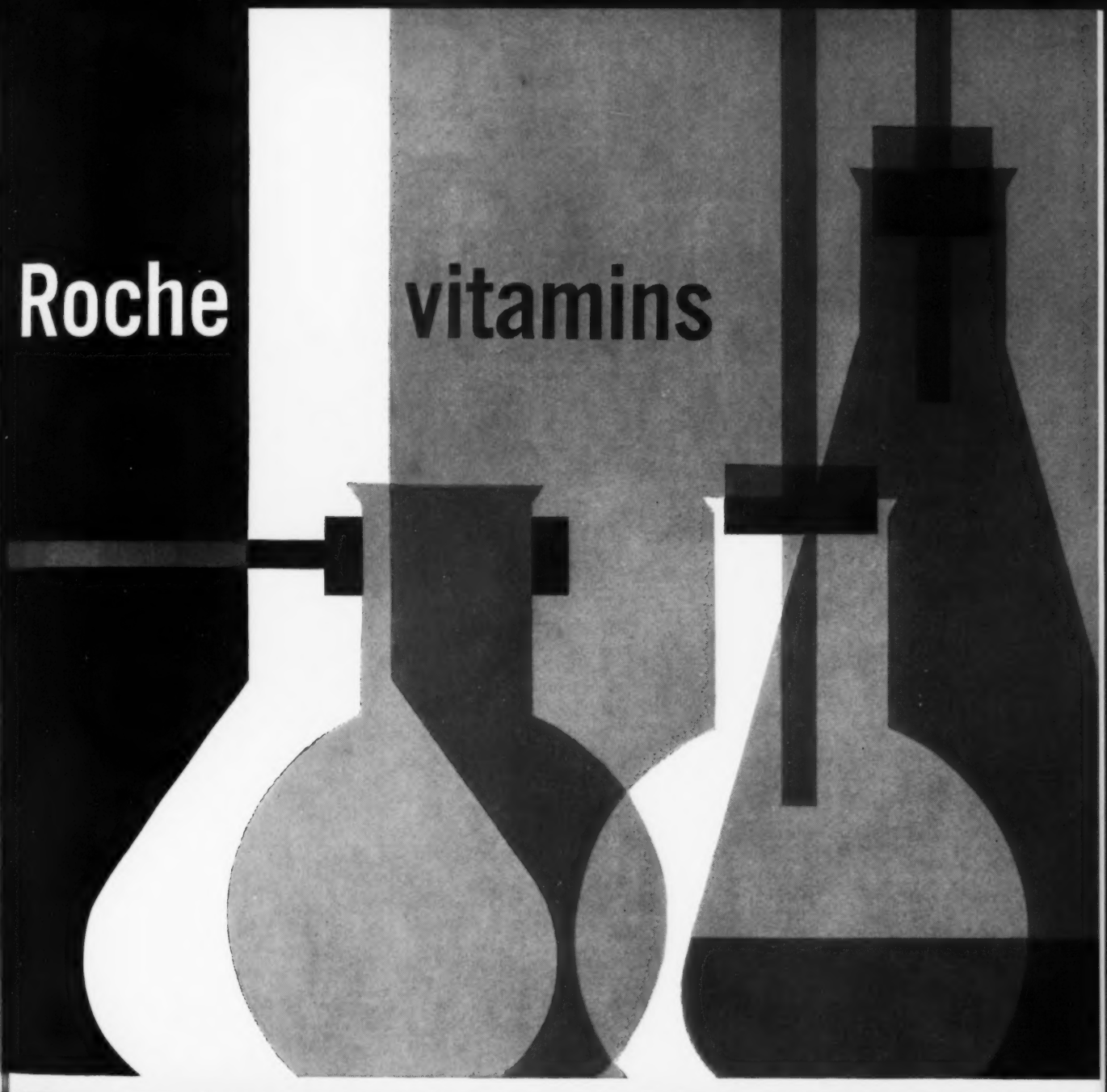

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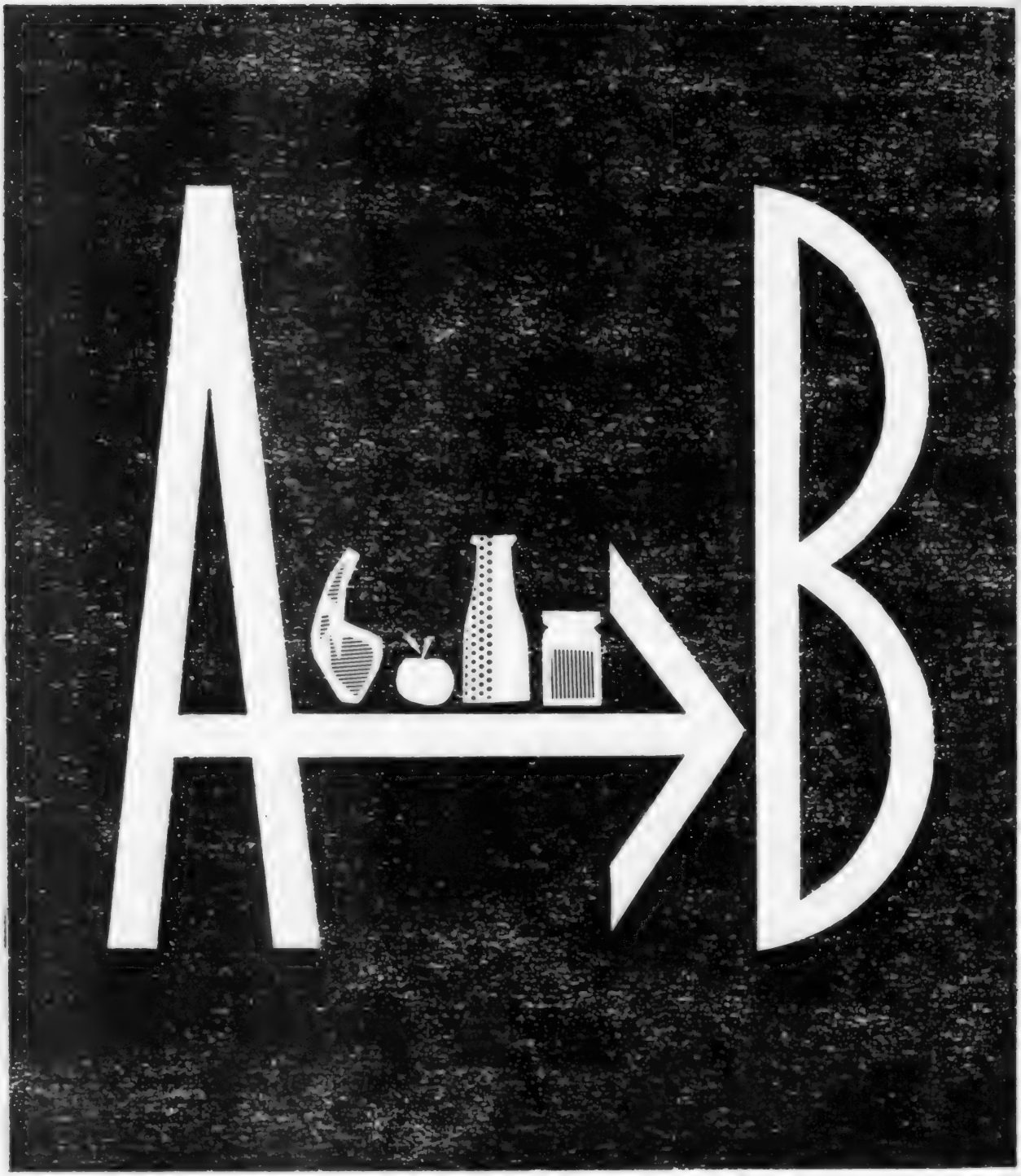

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DICALITE® TECHNICAL REPORT

DICALITE DEPARTMENT • GREAT LAKES CARBON CORPORATION • 612 SO. FLOWER ST., LOS ANGELES 17, CALIFORNIA

Unique Additive Filtration Discards Filtrate

Marty Harris, Dicalite engineer, reviews filtration procedure with A. H. Buck, plant manager, and R. C. Mosher, president of Barnett Laboratories.

The food additive carotene is widely used in margarine, shortening, bakery goods and pharmaceuticals where a natural yellow color and a high potency of vitamin A is desirable. A unique processing step, which might be called filtration in reverse, is employed by a leading producer of carotene – Barnett Laboratories, of Long Beach, California. Here, the liquid filtrate goes into cattle feed – and the valuable carotene is extracted from the filtered-out solids.

Barnett grows their own carrots . . . a special variety yielding at least twice as much carotene as the ordinary table variety, and taking twice as long to grow. After the carrots are crushed, the carotene is washed out and the liquid goes to filtration. A Dorr-Oliver rotary vacuum precoat filter is used, starting with an inch-and-a-half precoat of Dicalite Special Speedflow Filteraid. The knife is set for a minimum cut to remove the deposited carotene material with the least possible amount of filteraid. This material is flash dried and air conveyed to the final steps of solvent extraction and crystallization.

Dicalite, while helping Barnett work out their filtration problems, was also able to assist them in designing the flash drying air conveyor system. Careful consideration of the total process is typical of Dicalite service. We'd be glad to work with you.

The solid crude carotene coming off the knife is the object of Barnett's filtration.

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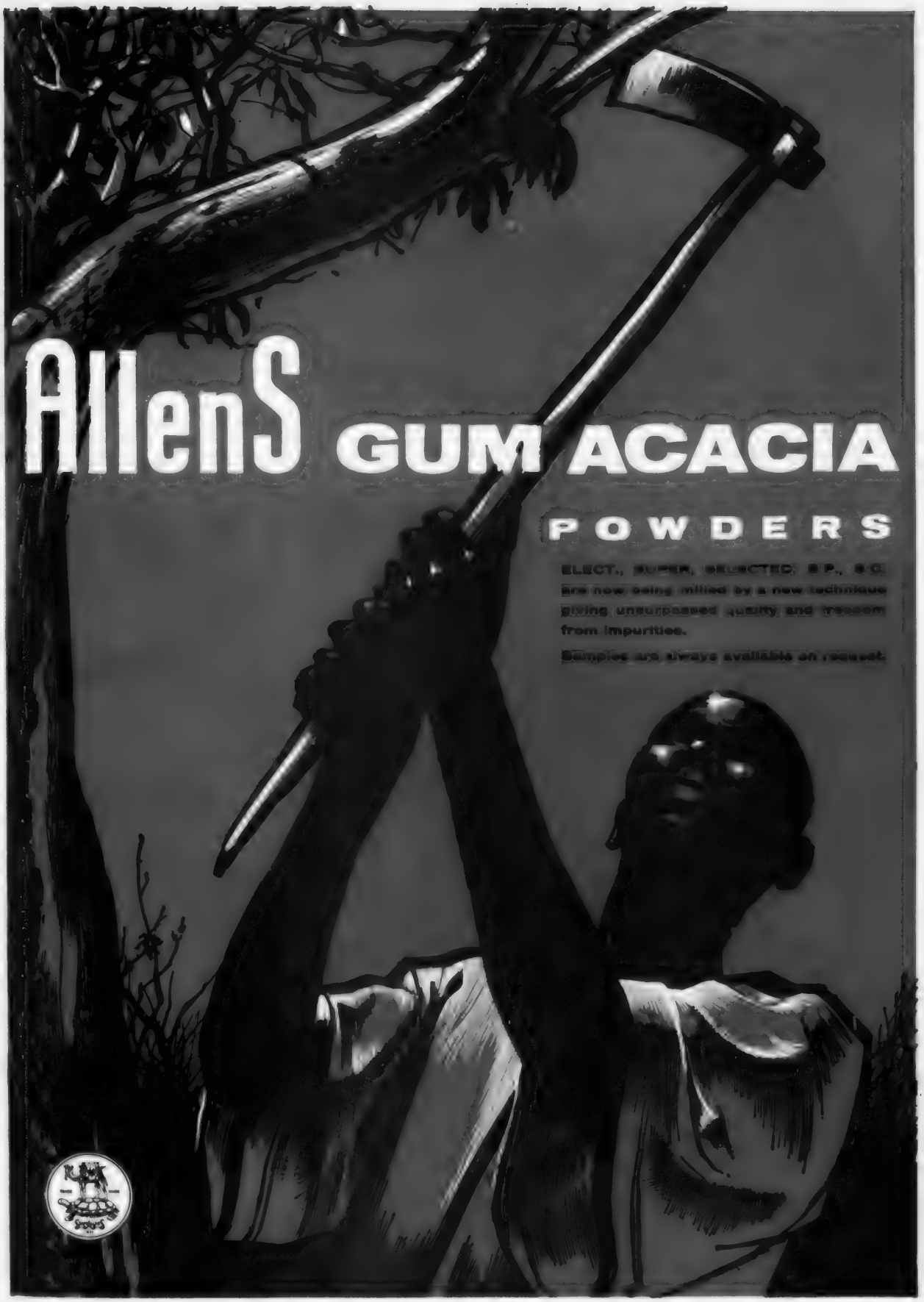

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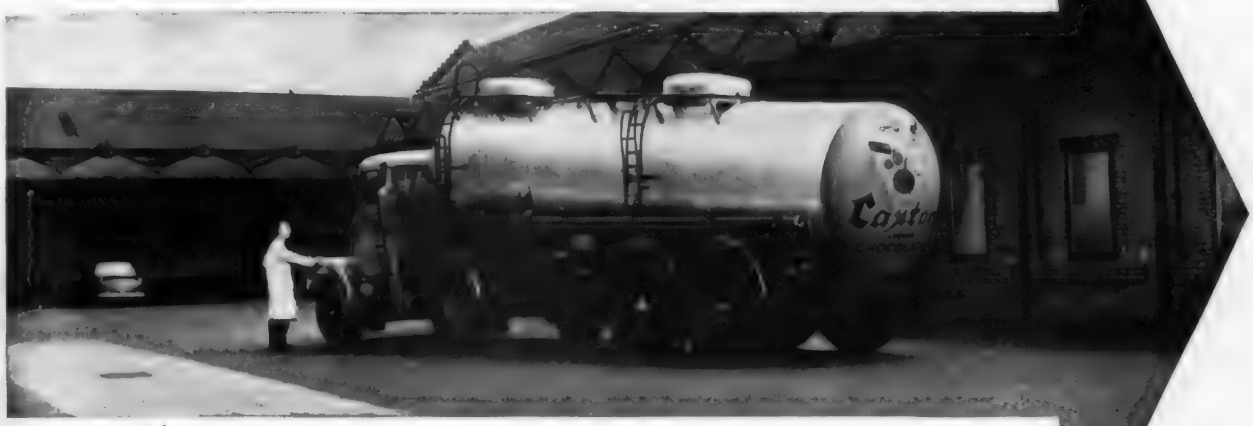

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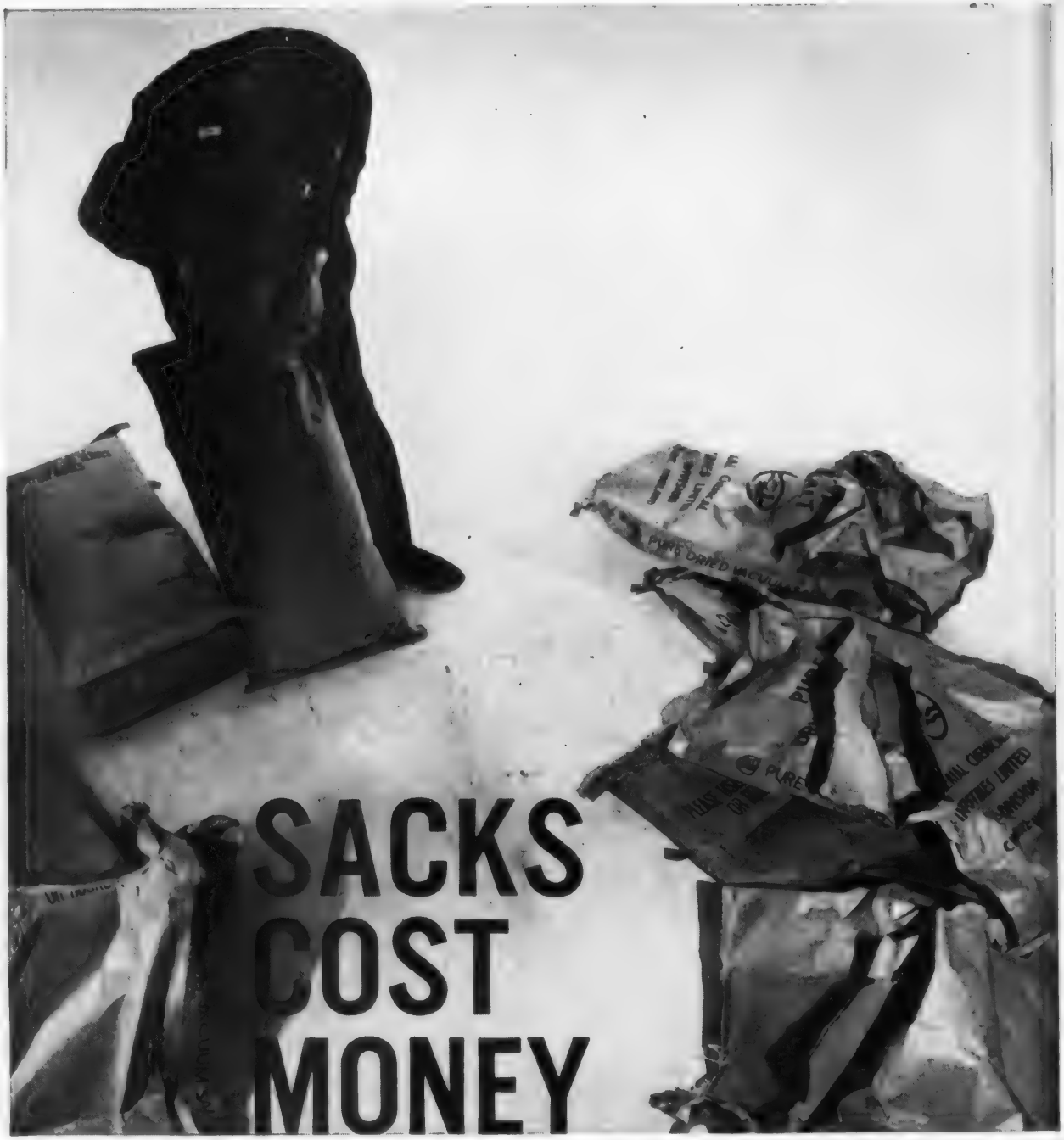

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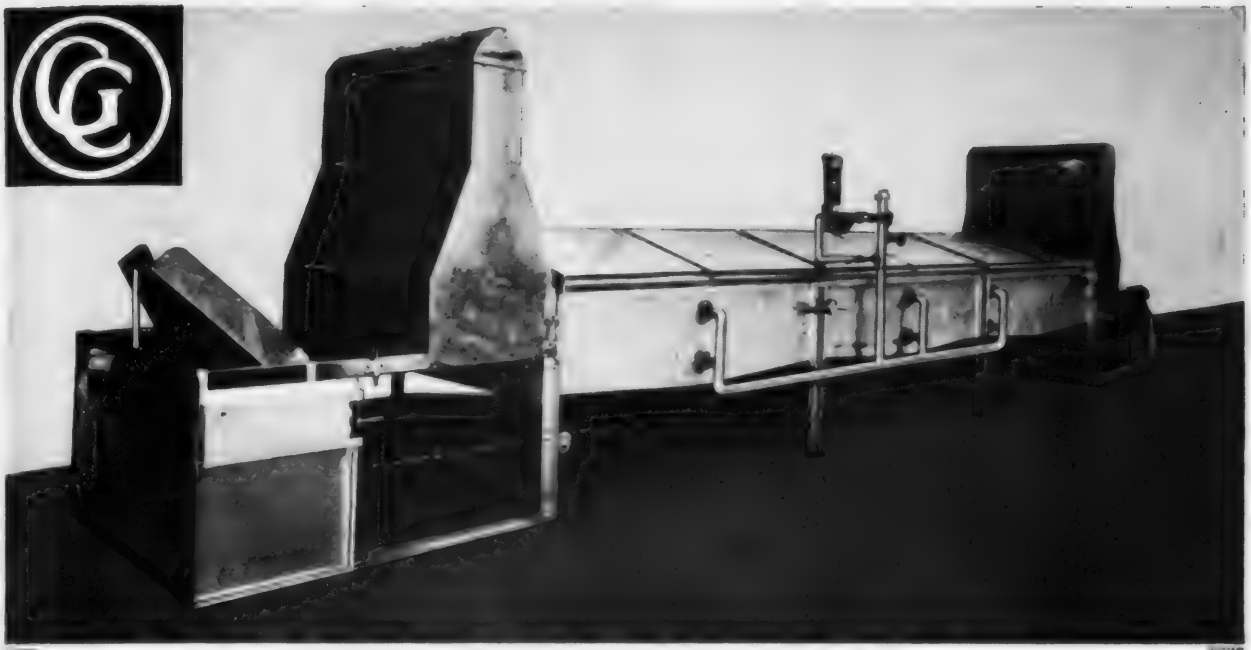

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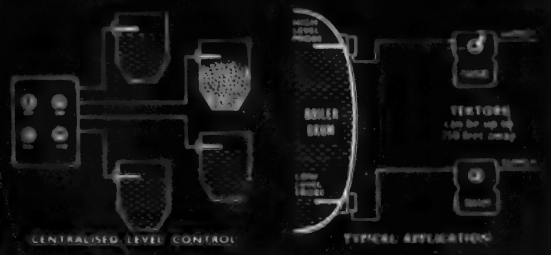

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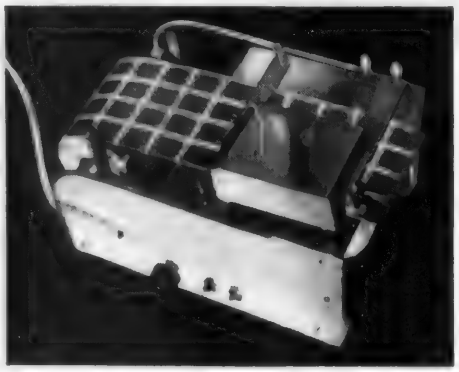

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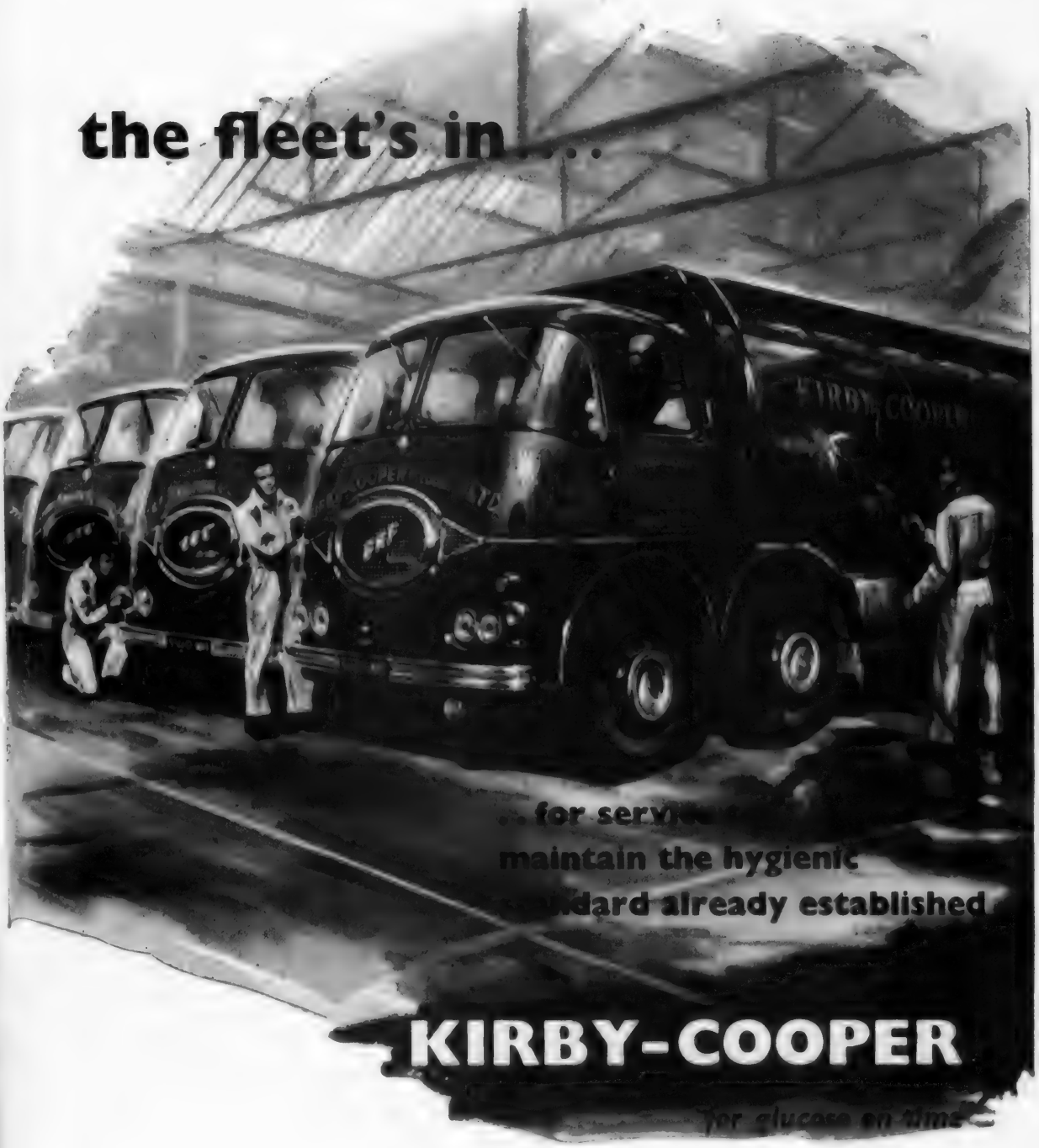

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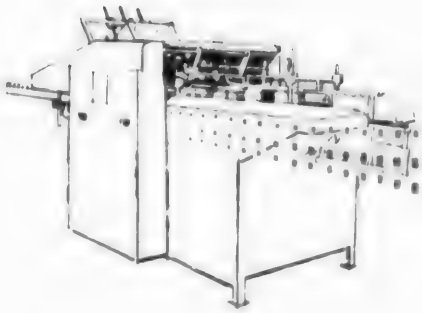

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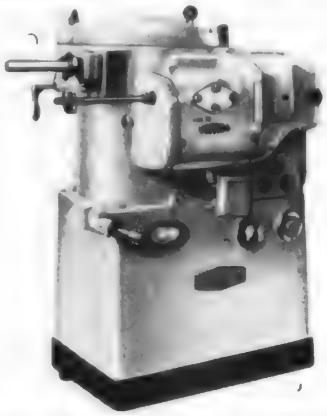

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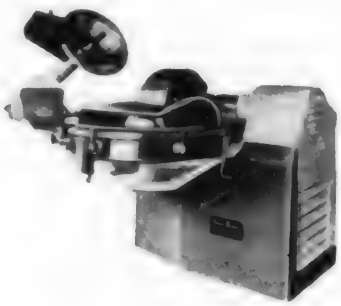

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EXHIBITION GROUNDS, WEMBLEY, MIDDLESEX, ENGLAND. TELEPHONE: WEMBLEY 6011 GRAMS: LIOPHIT WEMBLEY

All Keyed-up over Equipment problems?

Everything runs like clockwork with

WARCO ALUMINIUM EQUIPMENT

STACKING CONTAINERS

4 DEPTHS NOW OFFERED

Cat. No.

CS.24159–23½"x14½"x9½" **CS.24155–23½"x14½"x5½"**
CS.24157–23½"x14½"x7½" **CS.24153–23½"x14½"x3½"**

PRESSED FROM ALUMINIUM ALLOY

SPECIALLY TREATED TO GIVE MAXIMUM STRENGTH TO THE BASES.

- ★ Absolutely hygienic and easy to clean
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- ★ Positive stacking by extra deep swage
- ★ Available with or without base drainage holes
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WARWICK 'WARCO' Reg. Trade Mark ENGLAND
First Choice for Aluminium Equipment

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Stainless Steel Filters

- Body of stainless steel polished inside and out.
- Cage easily removed, without tools.
- Dairy couplings.
- Filtration down to ·002".
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Maltsters for more than a Century

The new METIOR floating plug plug cock

This new stainless steel plug cock has a floating plug suspended between two compressed sealing rings. Their pressures on the plug are individually adjustable by rotating the top and bottom caps which are easily freed by a light tap with a rubber mallet. The joint rings can be supplied in P.T.F.E., rubber or neoprene. It gives full bore flow, will withstand pressures up to 60 p.s.i. and is designed for in-place cleaning. Five sizes are available 1″, 1½″, 2″, 2½″ and 3″, both two-way and three-way.

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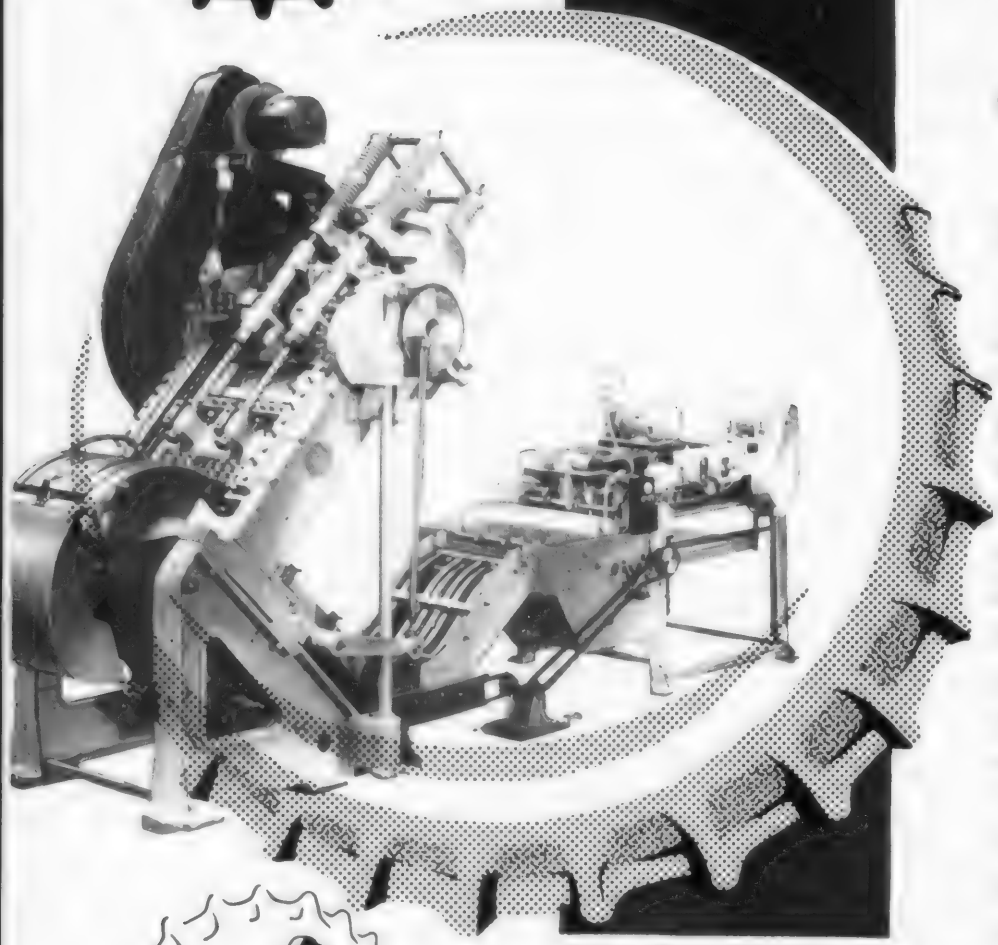
OTHER PRODUCTS INCLUDE: STAINLESS, CARBON AND ALLOY STEEL TUBES · MACHINED COMPONENT PARTS · STAINLESS TUBE FITTINGS · BI-METAL TUBES · 'FORJEND' AND 'LT' WELDING FITTINGS · CARBON AND ALLOY DRAWN AND GROUND BARS AND WIRE · NUCLEAR COMPONENTS

TBW 32

BLISS

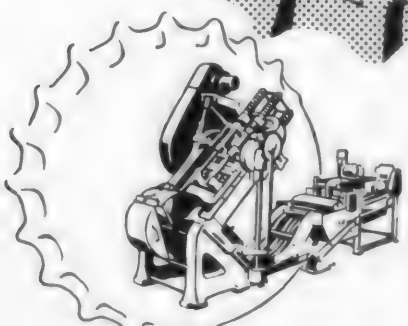
Automatic

BOTTLE CAP PRESSES

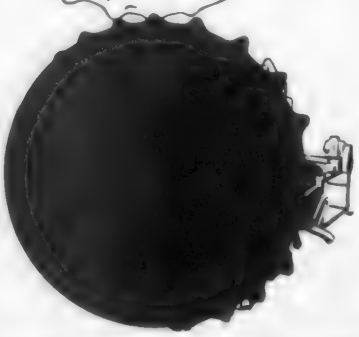


In answer to bottlers' demands for literally billions of crown caps, E. W. Bliss Co. offers a complete line for their rapid and economical production.

Key machine in the line is the Bottle Cap Press, of which two models are available. Completely automatic in operation, the operator need only keep the magazine filled to ensure continuous effective operation of the press.



No. 37 (16 die) fitted with rolling key clutch and spring counterbalance operates at 110 strokes per minute and gives up to 352 caps per sheet.



No. 37A (24 die) fitted with air operated friction clutch and air counterbalance on slide, operates at 130 strokes per minute and gives up to 528 caps per sheet.

E.W.BLISS (ENGLAND) LTD

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London Office: 2-3 The Sanctuary

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ADVANCE SINCE FINGERS
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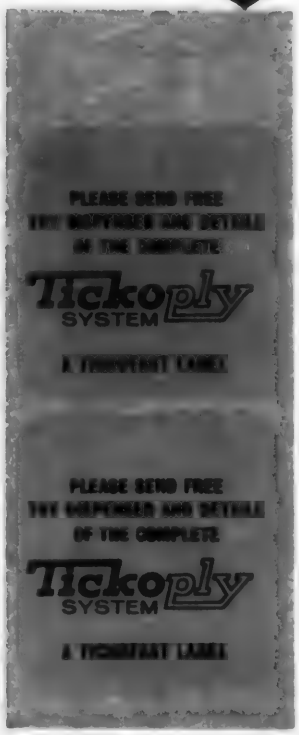
look at this



Stick this on your shirt.

See how it sticks and sticks!

The *Tickofast*, made specially for *fabrics* is

JUST ONE
of a full range of labels, window-stickers, etc., by Tickoply—the name that means today's smartest self-adhesive labelling.

TAKE ONE OFF
and press it to any firm surface—see how it sticks and sticks!

APPLY THE OTHER TO YOUR LETTER-PAPER
and mail to us today.

SELF ADHESIVE LABELLING ..

apply labels with this

It's called a 'MINI'.
It's the fantastic new 'baby' of a
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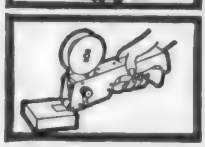
of manual and electrically-controlled dispensers, applicators and overprinters by *Tickoply*—the name that means today's smartest self-adhesive labelling.

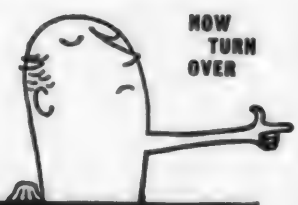
SEE HOW IT WORKS

1 PRINT
You squeeze the grip—the ticket is printed.

2 DISPENSE
You release the grip—the printed ticket is released for sticking on.



3 APPLY
You apply the 'gun' to the object's flat surface and pull down—PRESTO!



Tickoply Self-Adhesive Labels
Tickoply Dispensers
Tickoply Applicators
Tickoply Overprinters

...Co...ge with this → **Tickoply**

TICKOPLY DIVISION, TICKOPRES LTD.,
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Telephone: CITy 5373/5

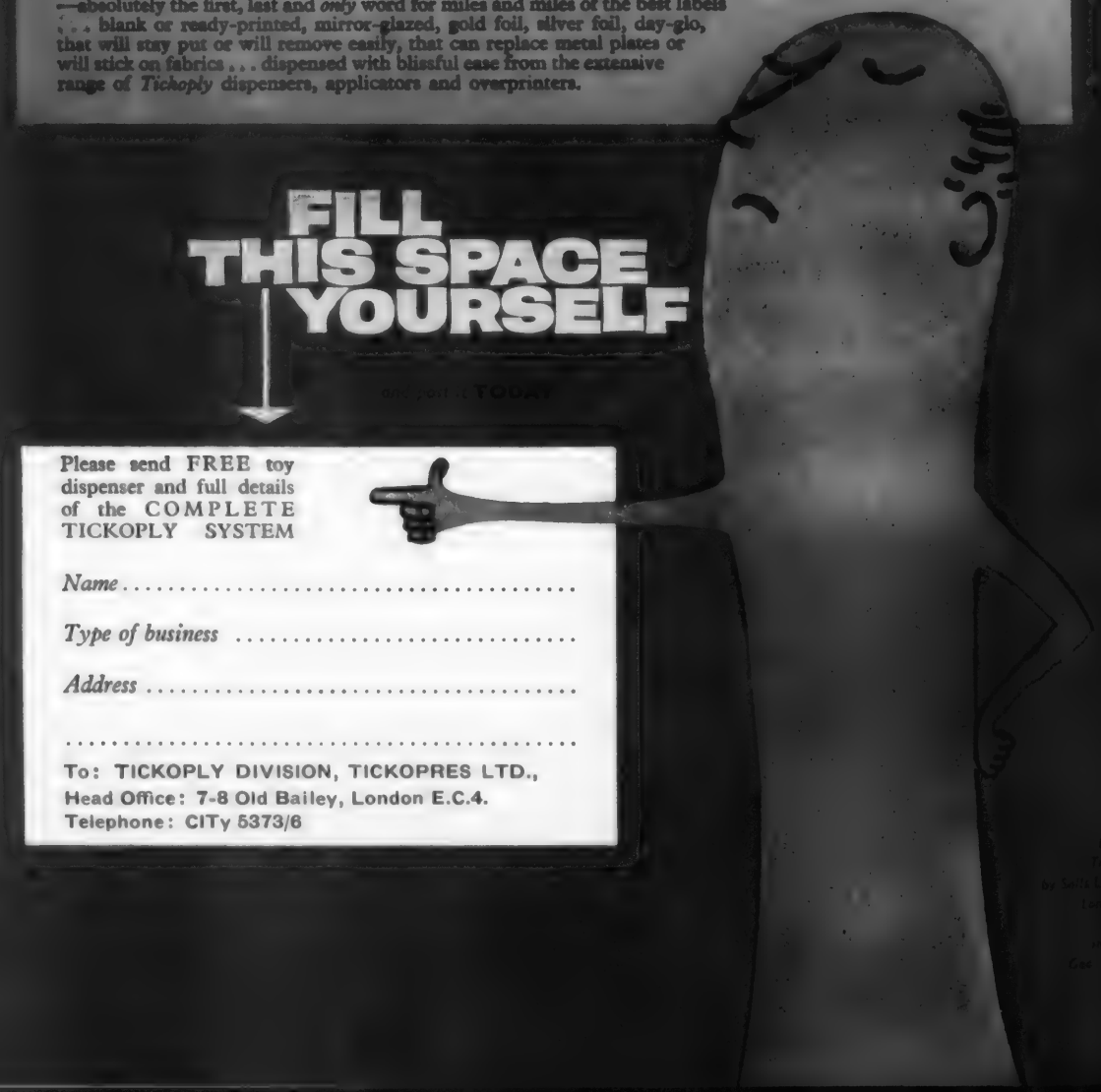
toy

THIS **FREE** DISPENSER CAN BE YOURS

either by playing the label game over-page or by completing and sending us the form below. This toy dispenser, loaded with self-adhesive labels, will give you a practical introduction to the

Tickoply SYSTEM

—absolutely the first, last and *only* word for miles and miles of the best labels . . . blank or ready-printed, mirror-glazed, gold foil, silver foil, day-glo, that will stay put or will remove easily, that can replace metal plates or will stick on fabrics . . . dispensed with blissful ease from the extensive range of *Tickoply* dispensers, applicators and overprinters.



FILL THIS SPACE YOURSELF

and post TODAY

Please send FREE toy dispenser and full details of the COMPLETE TICKOPLY SYSTEM

Name .....

Type of business .....

Address .....

.....

To: TICKOPLY DIVISION, TICKOPRES LTD.,
Head Office: 7-8 Old Bailey, London E.C.4.
Telephone: CITy 5373/6

Would it be acid ? An alkali, perhaps ? Or even a highly active solvent ? Certainly any or all of these can constitute a major corrosion problem in many an industrial process. Or they *did* do so before KEEBUSH and KEEGLAS made things so much easier.

Since Kestner introduced KEEBUSH some 30 years ago, this tough, lightweight plastic—it's a phenol-formaldehyde resin — has proved its exceptional anti-corrosive properties in almost innumerable forms, from pumps and fans to pickling baths and pressure vessels.

Even a complete plant, handling a variety of corrosive agents, can be most advantageously fabricated as a unit, using this supremely versatile material. Mouldings up to 20,000 lb in weight and tanks 100 feet long are regularly produced in one or other of the several grades of Keebush. Different resins and fillers, with equally variable manufacturing techniques, enable precisely the required qualities to be secured.

But Kestner didn't stop there — they have also developed KEEGLAS, a series of light, strong, acid-resistant glass fibres, offered in the complete range of Kestner unit plant.

Further, Kestner are exploiting the industrial applications of such other plastics as PVC, Terylene, Nylon and Courtelle in finding the answer to every corrosion problem.

And every such problem Kestner examine individually—as they will look into yours, if you simply write to the address below:—

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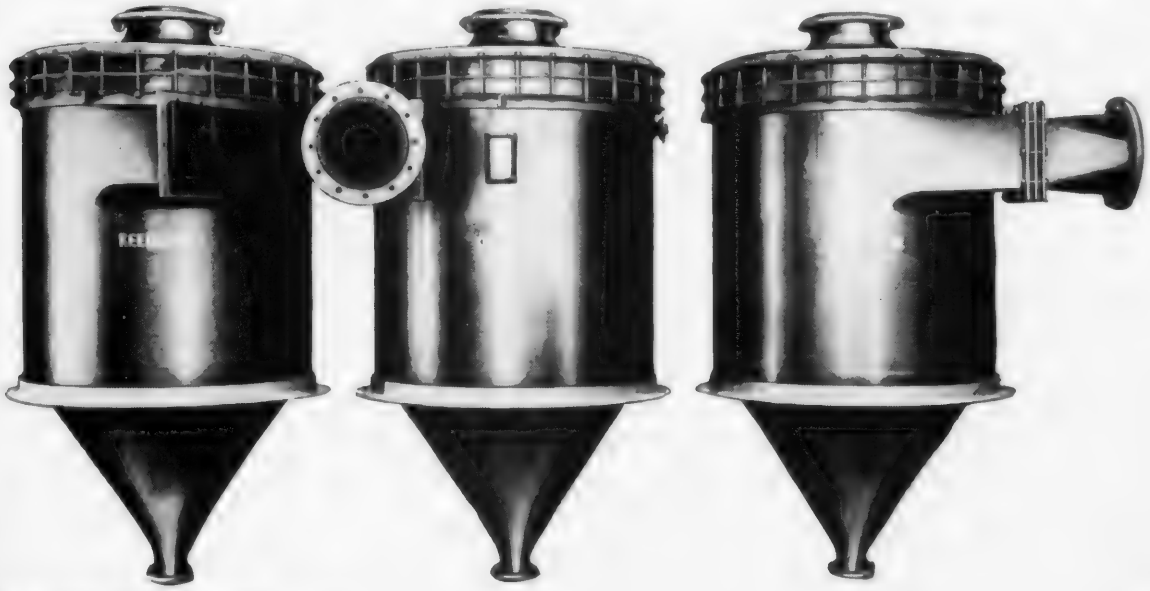
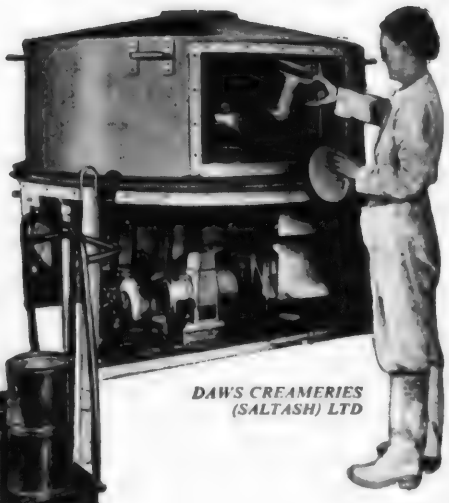
CHEMICAL ENGINEERS

THE KESTNER EVAPORATOR & ENGINEERING CO. LTD · 5 GROSVENOR GARDENS · LONDON, SW1



CONTAINERS...
HUNDREDS
OF CONTAINERS



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(SALTASH) LTD

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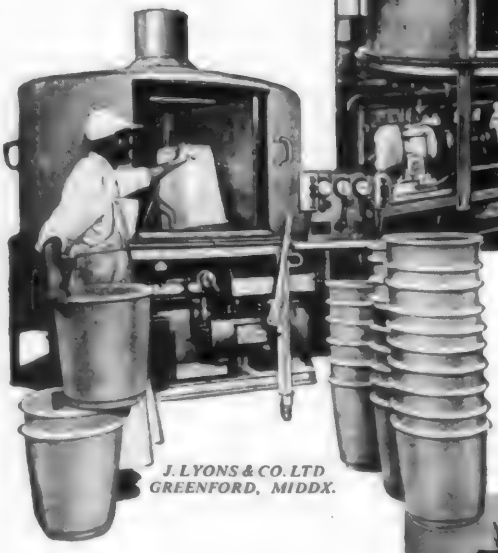
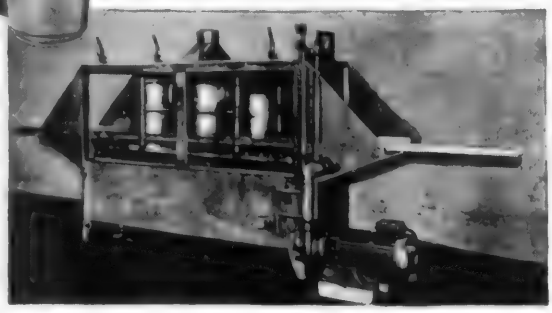


J. LYONS & CO. LTD
GREENFORD, MIDDX.

washed by W.H.
...in double-quick time



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W. H. washing equipment handles containers with amazing speed and thoroughness. Out they come, clean as whistles, completely ready for further service.

W. H. have solved can, churn and container washing problems in many industries, and their wealth of experience is freely at your disposal. If you have a container-washing problem, Wright Hargreaves can supply the answer—either as a standard machine, or as equipment specially tailored to meet your individual requirements.

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Whatever your problem, we'll be happy to study it and make recommendations.

Wright Hargreaves are the sole agents in England, Scotland and Wales for Silkeborg Plate Heat Exchangers that meet the highest standards of the food industry.

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STAINLESS STEEL

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1½ TONNER

with long life petrol or diesel power unit

BUILT with your needs in mind, the Commer 1½ ton forward control model thrives on the toughest assignments . . . triumphs magnificently over the fierce strain of "stop-start" delivery work. A sterling example of Commer reliability, this lively four-cylinder model is quality engineered and gives the utmost economy of operation. Primarily fitted with all-steel van bodywork distinctively modern in style, the chassis also accommodates special bodies to suit individual requirements such as the above.

A ROOTES PRODUCT — BUILT STRONGER TO LAST LONGER!

COMMER CARS LTD. LUTON BEDFORDSHIRE

EXPORT DIVISION: ROOTES LTD. DEVONSHIRE HOUSE PICCADILLY LONDON W.1

Now! Gels without sugar for dietetic foods

Sauces - fruit jells - aspics - relishes - desserts - low-calorie jams.

Here's a new field – with new profits – for you!

With EXCHANGE LOW METHOXYL PECTIN, you can now make a *full line* of gelled foods of any degree of sweetness – even sugar free and low in calories for diabetics and dedicated weight-watchers!

L. M. Pectin is the only pectin that forms a true gel without sugar. The gels keep their shape and firmness at room temperature – yet are tender, elastic, sparklingly brilliant and perfect for flavour.

GET FULL INFORMATION on this exclusive development of Sunkist citrus research – including technical data and formulas from:

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Registered Trade-Mark

here is the FIRST British PLASTICS milk bottle

FIBRENYLE LTD now offer a polypropylene, 1 pint milk bottle that is light in weight, has a greater resistance to abrasion and unsightliness (as against the original polythene bottle), has a far longer "journey-life" than glass and will conform to normal sterilising, filling and capping tests to an entirely satisfactory degree.

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SKYLON HOUSE · PARK ROYAL ROAD · LONDON · N·W·10

ELGAR-6006

JACW1/41

To and fro with Milk—

forward with TRANSPORT

Improved facilities for milk collection . . . for a certainty this means bulk handling and this is the job which Butterfield Road Tanks take over and perform soundly and economically. Supplied to many leading Food Manufacturers and Milk Distributors, these strong, reliable Road Tanks are insulated as required to maintain their bulk liquid contents at the correct temperature.

Fabrication is in Aluminium Mild Steel and Stainless Steel

Our illustrations show:
(extreme top)
1,750 gallons gross capacity, single compartment Stainless Steel Bulk Milk Collection Tanker, fitted with positive rotary pump in rear compartment.
And above
3,000 gallon two compartment Milk Tank fabricated from 10 gauge 18/8/Mo. Stainless Steel. Insulated with 2" thick Onazote covered with cream-pigmented fibreglass sheets. Mounted on A.E.C. Mammoth Major Mark V chassis.

Butterfield Road Tanks

APPROVED LLOYD'S CLASS 1

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This delivery van is one of eight made by Harkness Coachworks Limited, 24/45 McTier Street, Belfast 13, for Tip Top Bakeries Ltd., Belfast. The interior is lined with 'Darvic' I.C.I. rigid p.v.c. sheet.

'Darvic' makes a tip-top van lining

If you want to make the interior panelling of a delivery van really good looking and thoroughly hygienic, the ideal material is 'Darvic' rigid p.v.c. sheet made by I.C.I. Many owners of van fleets agree, including Tip Top Bakeries Ltd. of Belfast.

'Darvic' combines very light weight with rigidity, even in thin sheets. It is easy to clean, never needs painting and retains its glossy surface. If you would like more information about 'Darvic' and the Technical Service available any I.C.I. Sales Office will be glad to help you.

'DARVIC'

'Darvic' is the registered trade mark for the rigid p.v.c. sheet manufactured by I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LIMITED · LONDON · S.W.1

PD99

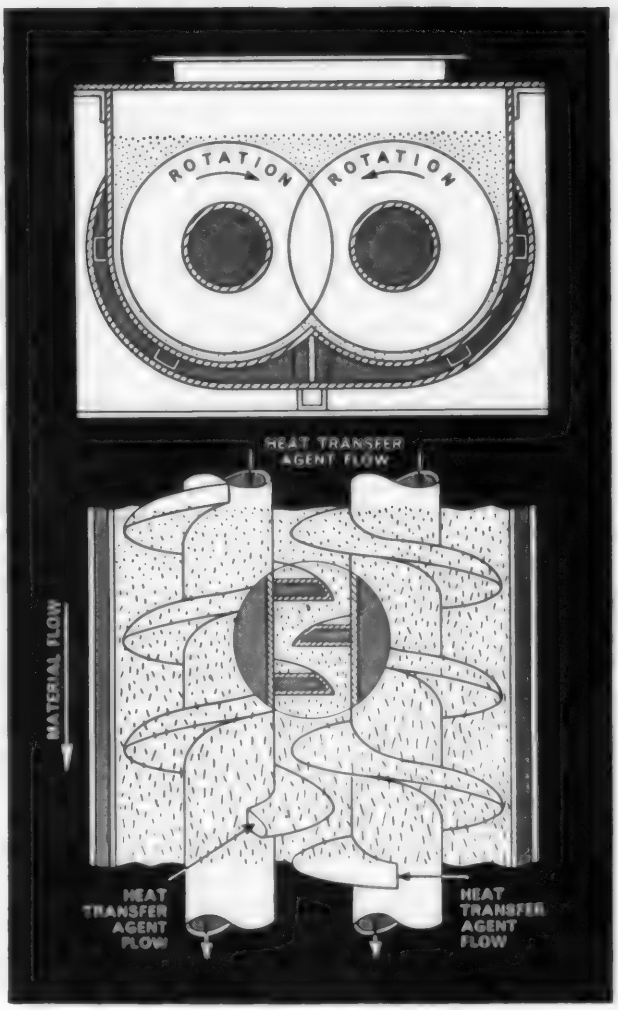
THE "HOLO-FLITE"

Registered Trademark

PROCESSOR

A continuous heat exchanger

The 'Holo-Flite' Processor is a continuous indirect heat exchanger that combines maximum heat transfer area with minimum space requirements. Being designed as a screw conveyor with helical, hollow flights through which the heat transfer agent is circulated, it conveys the material to be heated, cooled or dried at a uniform, pre-determined rate.



Sectional view of a double screw unit showing counter flow heat transfer conditions.

Principle of operation

The heat transfer agent is completely isolated from the material being processed and the heat is transferred to or from the transfer agent by contact with the hollow flights. The unique and patented feature of intermeshed rotating screws subjects the particles of material within the mass to continuous movement by the flights and, in constantly changing position, they make frequent and repeated contact with the heat transfer surfaces.

For full details ask for a copy of Publication No. 201/39.

HOLDAN Engineers (London) Limited

(In association with W.C. Holmes & Co. Ltd.,)

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C 391

Experts in AUTOMATIC HANDLING AND BATCH BLENDING

The combination of Robinson of Rochdale, and Elliott Brothers (London) Ltd.—a member of the Elliott Automation Group—offers you unique facilities in the field of automatic handling and batch blending of powdered and granular materials. These two organisations have designed and built highly efficient cost-saving installations for plants throughout the country.

Not only have *complete* handling/blending systems been tailor-made for large and complex plants, but smaller manufacturers have also benefited from the range of standardised components which Robinson Elliott offer for all phases of automatic handling and batch blending—pneumatic conveying, electrical weighing, storage and remote control.

A COMPLETE SERVICE

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Robinson ELLIOTT — *automatically cut handling costs!*

THOMAS ROBINSON & SON LTD., HANDLING DIVISION, ROCHDALE, ENGLAND.
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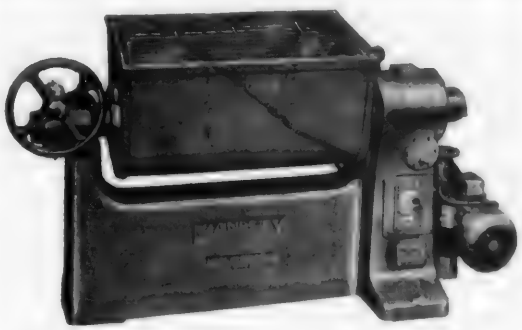
. . . and the amazing **FITZMILL**

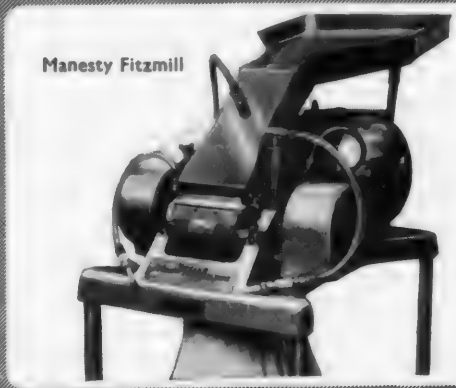
The NEW MANESTY STAINLESS STEEL MIXER has 6 cubic feet working capacity. It is additional to the 'H' Mixer of 3 cubic feet capacity. Both with removable paddles, safety guards, transparent plastic lid and tilting gear.

The NEW MANESTY DRUM MIXER has 2 cubic feet working capacity and can be supplied with interchangeable stainless steel or galvanised drums.

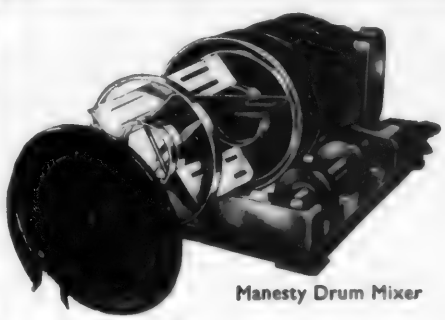
There is also the MANESTY FITZMILL for high speed Wet or Dry Granulation — Mixing — Chopping or Pulverizing.



Manesty '300' Stainless Steel Mixer



Manesty Fitzmill



Manesty Drum Mixer

Manesty 'H' Mixer

Write for further details to:

MANESTY MACHINES LIMITED
SPEKE, LIVERPOOL, 24
Telephone: Hunts Cross 1972
Telegrams: Manesty, Liverpool, 24

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DIFFERENT

—to satisfy such fastidious industrialists as dairymen, brewers, and manufacturers of foodstuffs, beverages, medicines and all edible fluids

The Easy Access L Valve illustrated has union nuts to permit speedy removal of the complete valve and a quick-release clamping nut that simplifies dismantling of the body for frequent sterilizing (bonnet and mechanism being isolated need no such treatment). Stainless steel body, polished internally and externally. SS handle. Polished aluminium bonnet. Position indicator. Sweetened diaphragm. Sizes 1″—3″. Also available as an angle valve.

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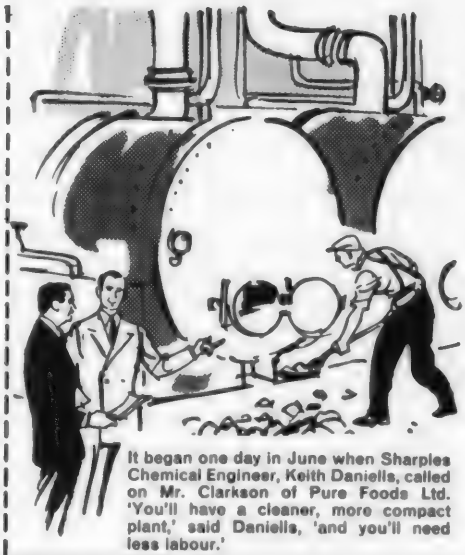
Food manufacturer switches to Sharples centrifugal trimming and fat rendering

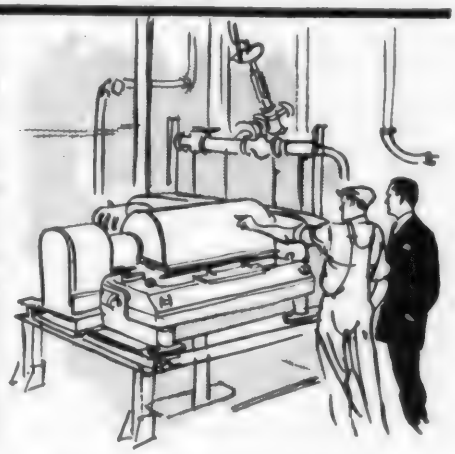
Gets better quality fat and meat product



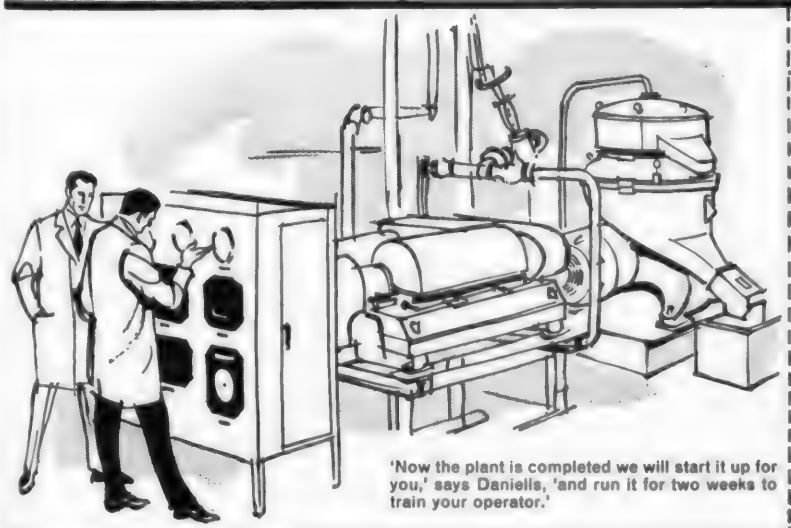
It began one day in June when Sharples Chemical Engineer, Keith Daniells, called on Mr. Clarkson of Pure Foods Ltd. 'You'll have a cleaner, more compact plant,' said Daniells, 'and you'll need less labour.'

'How about product quality?' asked Mr. Clarkson. 'You'll get better quality fat and meat product,' explained Daniells, 'because low temperature prevents degradation of your fat and meat.' He also showed pictures of Sharples plants all over the world.

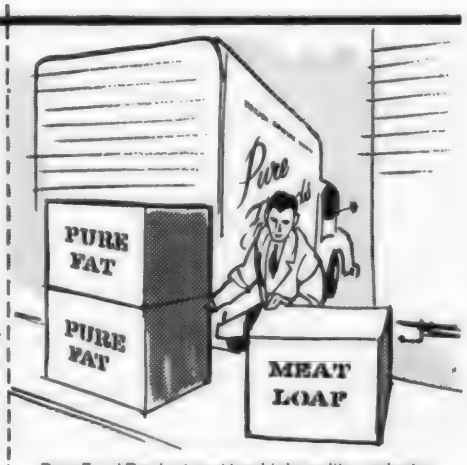
Sharples engineers, after visiting Pure Foods factory and collecting complete information, complete the layout of a plant for Pure Foods particular needs.



Sharples engineers supervise installation of plant on the site. Sharples carry the load so that Mr. Clarkson has no worries or problems.



'Now the plant is completed we will start it up for you,' says Daniells, 'and run it for two weeks to train your operator.'



Pure Food Products get two high quality products which sell easily and profitably – Pure white fat and a premium meat product. Mr. Clarkson is a happy man – less worries – more profit.

P 26

SHARPLES

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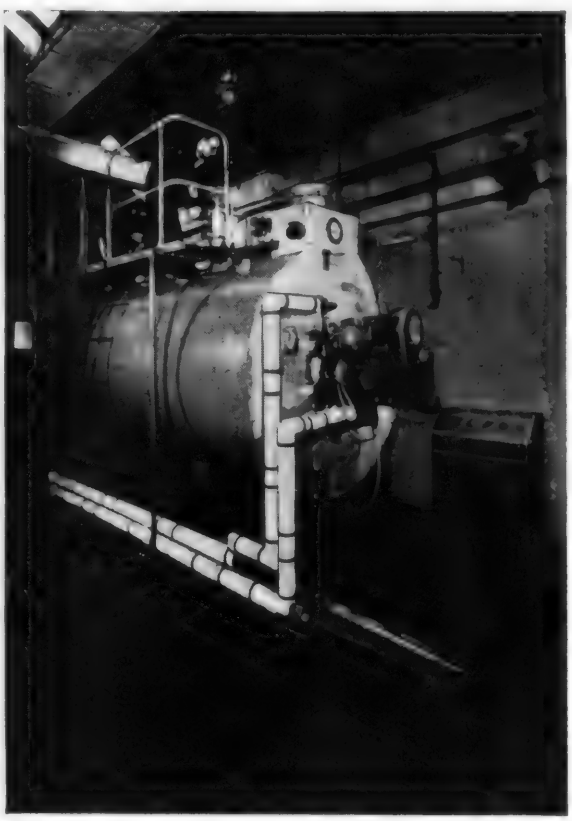

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GI/39

FOOD
Manufacture

Volume 36. Number 10 Editor: Anthony Woollen, B.Sc., A.R.C.S., A.R.I.C. October 1, 1961

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Number 38 October 1961

Glossary of Terms (cont.)

LODERS and NUCOLINE LTD.

INFORMATION BULLETIN

This advertisement is one of a series of Information Bulletins issued by Loders & Nucoline Ltd. Copies are available, together with a folder, on request to Loders & Nucoline Ltd., Unilever House, London, E.C.4.

Polymorphism

Polymorphism is the ability of an oil or fat to solidify in more than one crystal form, each possible form having a different melting point. The one with the highest melting point is usually the most stable and other forms always tend eventually to change to this form.

Pro-oxidant

This is a substance which, if present in an oil or fat, will promote oxidative rancidity.

Refined Oil

A refined oil is an oil which has been subjected to the three refining processes of neutralising, bleaching and deodorizing.

Refractive Index (See Bulletin number 14).

A measure of the extent to which an oil or liquid fat will bend a beam of light when passing through from air; it is measured by a refractometer.

Reichert Value (See Bulletin number 15).

Reichert value is a measure of the water-soluble steam volatile fatty acids present in an oil or fat.

Reversion

This is the development in a refined oil or fat of an off-flavour which resembles that flavour previously removed by the refining process.

Saponification (See Bulletin number 14).

Saponification is the reaction of a fat or oil with a strong alkali to form glycerol and soap. The theoretical amount of alkali required is given by the Saponification Value of the oil or fat. This is defined as the number of milligrammes of potassium hydroxide required to saponify one gramme of oil or fat. From the Saponification Value may be calculated the Saponification Equivalent which is the number of grammes of an oil or fat saponified by one gramme equivalent of potassium hydroxide.

Saturated

Fatty acids have long chains of carbon atoms (each having four bonds). If all the free bonds are occupied by hydrogen atoms, the acid is said to be saturated. Oils consisting mainly of the glycerides of saturated fatty acids are generally solid at normal temperatures.

Setting Point (See Bulletin No. 20)

When melted fats are allowed to cool, supercooling usually occurs and eventually a point is reached when the latent heat of solidification overcomes the cooling effect and the temperature begins to rise as the fat solidifies, finally reaching a maximum point. This is often called the setting point. (Refer also to definition of Melting Point.)

Short Melting Range

This is a term applied to those fats which completely melt over a small or short temperature range. Such fats, when completely solid, have a hard and brittle texture as opposed to fats with a long melting range which tend to have a softer texture.
(Refer also to definition of Melting Point.)

Slip Point (See Bulletin No. 19)

The temperature at which a column of fat in the bottom of an open capillary tube is observed to rise when the tube is partially immersed in water and heat is applied.
(Refer also to definition of Melting Point.)

Soap

Soap is the product formed when
(a) fatty acids are neutralized by alkalis and
(b) neutral fats are saponified by strong alkalis.

Softening Point (See Bulletin No. 19)

This is the temperature at which a ¼" ball bearing has passed half way through a specified column of fat when heat is applied.

Solids Index (See Bulletin No. 20)

This is a method of expressing the dilatation of fats as a percentage of solid fat remaining at any given temperature.

LN 84 8058

FOOD
Manufacture

Vol. 36, No. 10 October 1, 1961

Catching the A.F.D. market

WHILE British manufacturers scratch their heads and wonder how to gain acceptance for A.F.D. foods on a broad front, Armour of U.S.A. have initially concentrated attention on a narrow field where the virtues of these foods are displayed to maximum advantage, and their biggest disadvantage—unattractive appearance—becomes of minor importance. In producing a range of freeze-dried food for picnickers, hikers and campers, sportsmen and expedition parties, the lightness and ease of preparation of such foods are their biggest selling points, while the possible disadvantage already mentioned is not likely to loom very large in the minds of ravenous outdoor people after a strenuous day of fishing, boating, walking or climbing.

A foothold in this market having been secured, the bridgehead can be broadened and the way made clear for such foods to gain wider acceptance. It seems to us that our cousins across the Atlantic are displaying rather more imagination in presenting these novel foods to the public than are manufacturers here. It is the old, old story that whereas we may have a bright idea first, the Americans are quicker off the mark at exploiting it commercially. It is a little discouraging when firms who have a good story to tell hide their light under a bushel in true British fashion, fearful lest the ton of credit which would accrue to themselves should result in an ounce of dubiously valuable information going to their competitors. There is, for example, the unmentionable firm (everyone knows who it is) who have been producing freeze-dried coffee for the last three years at a place we are not allowed to name (but everyone knows where it is). This is not the only food plant, be it noted, to grind out its hush-hush product in great secrecy. It all seems rather silly and pointless.

We are reminded of the story (allegedly true) of the American passenger on the *Queen Elizabeth* who remarked to his British travelling companion that it was a pity the British could not build big ships like that. We refer once again to our comments on p. 271 of our June issue and merely remark that if British manufacturers lose business in freeze-dried foods because other people are first in the field, they will have only themselves to blame.

Since these words were written the plans of a number of British manufacturers have been announced. Mars, Ltd., with their *Yeoman* brand, Batchelors, Colmans, Lyons and several other firms are putting their products on the market soon, and the first packs should appear before the end of the year. As Brooke Bond's name has recently appeared in *The Financial Times* in connection with freeze-dried coffee there seems little point in concealing the fact that this firm's product has been on the market for some time.

Spice ups and downs

IN EARLIER times spices have often been worth their weight in gold. Wars have been fought for them, empires have been established on them, occasionally whole cities have been ransomed for them. Struggle for the mastery of the rich spice trade of the East Indies was largely at the root of the maritime slogging match between Portuguese, Dutch and British which started in the Middle Ages and lasted until practically the turn of this century.

Spices occupy a niche of their own among the various things we eat. Not exactly foods, not exactly flavours, the character they add to food is out of all proportion to the amount used. In the total value of world commerce they comprise less than one tenth of one per cent. Yet for a number of countries they are a big exchange earner. In Zanzibar, spices, mainly cloves and clove oils, bring in 81% of the export earnings. For Granada the figure is 54%, for the Seychelle Islands about 19%, for French Oceania about 15% and for Madagascar over 10%. Spices are of dominant importance to the earnings of a few islands, but a relatively minor item in the trade and economic life of a fairly large and widely distributed number of territories. The biggest importers are Western Europe and North America, each taking about 26% of the spice exports in 1958. Pakistan, India and Indonesia import 14%, the Near East 12% and Latin America 9%.

Spice consumption varies widely from one country to another. In the East, spices are consumed in large amounts to make an otherwise monotonous diet more exciting. In the West, spices are a minor item in the family budget and the quantity consumed is influenced more by cooking and eating habits than by price or income. The growth of ready-to-eat foods has tended to reduce spice consumption in Western countries.

A paper on trends in the world market for spices, prepared for the FAO Committee on Commodity Problems which met last June, shows how spice prices have fluctuated over recent years. The average rise in prices since 1938 has been 740%, a sharp rise compared with the average of 282% for all primary products such as wheat, rice, oranges, tea and cocoa. The total value of world trade in spices now amounts to over £35 million, compared with less than £8 million in 1938.

New spice processing methods for better hygiene

PEPPER and cloves alone at present account for half the total trade value of spices, but their share was even larger before the war. Sharp fluctuations in prices have caused much concern to producers and users. Sarawak pepper, for example, 2s. a lb. in 1946, rose to over 12s. in 1951, dropped to 7s. 6d. in 1954, fell again sharply and last year reached 4s. 3d. Zanzibar clove prices rose from about 2s. in 1950 to over 9s. in 1953 and since then have gradually fallen to a little over 2s. 9d. a lb. Jamaican ginger, which cost about 72s. a cwt. in 1948, suddenly started rising in the following years, and in 1951 touched the peak of about 454s. a cwt. In 1953 the price fell to just over 111s., in 1957 was 565s. and last year came down to about 228s. a cwt.

For all their value, and perhaps because of it, dried ground spices are not among the cleanest of food materials. Adulteration has been rife; ground pepper, for example, has frequently been diluted with all manner of materials such as ground husks, berries and even sand. The nature and colour of ground spices is such that sometimes only experts can detect the adulteration. The crude methods of harvesting, grinding and packing, too, often leave their traces in the filth and bacterial contamination which the products of primitive countries are apt to contain. Partly for this reason and partly in order to standardise the potency of a varying natural product, new methods of spice processing have been developed in the last few years which extract the potency but eliminate the rubbish. The active constituents are incorporated on a non-biological base such as salt or other material which can be chosen to suit any purpose and which can be sterilised. The potency of such an extract can also be standardised, with obvious advantages to the manufacturer who incorporates spices in his products.

We believe the idea of such spice preparations originated in the U.S.A., but much development work has been going on in this country, and several British firms are now offering a range of sterile standardised spice preparations claimed to contain all the desired constituents of natural spices bar the filth. The active principles of spices are a subtle blend of many oils and volatile constituents often present in little more than traces; early attempts to make spice extracts often failed to conserve the more evanescent of these. It is claimed that these difficulties have now been overcome.

It does seem rather illogical for a manufacturer to buy a product containing 95% of unwanted wood fibre and a goodly measure of bacteria when all he wants is the pungency and aroma. To provide him with the last two without the first two is a step in the right direction.

The pure melody of ice cream

SOME of the electric chime gadgets used by ice cream vendors to announce their presence in residential districts have been causing annoyance, say Wall's. Are they telling us? The blasts of distorted electronic harmony which these merchants turn on and off at frequent intervals as they wend their way put even the usual Sunday afternoon suburban noises to shame, drowning the sounds of motor mowers, "do-it-yourself" power tools, motor cycles and other cacophanous concomitants of civilisation with which the city-dweller in repose loves to surround himself.

The whole trouble, say Wall's, is that the ordinary ice cream vendor's broadcasting equipment is not hifi. "The normal method of reproducing musical notes on the average ice cream vehicle," we are told, "is to suspend a microphone close to a musical box, amplify the signals from the microphone and then reproduce them through a loudspeaker. This of course is a very simple method but unfortunately it frequently introduces distortion which causes great annoyance."

The answer to this is claimed to be a new gadget containing "an electric tone generator, which consists of any four Dulcimer notes suspended above four transducers. An electric motor when switched on causes these four musical notes to be struck in any sequence. The musical notes act as diaphragms to the transducers so that pure, undistorted signals are generated in the transducer circuit. The signal

in the circuit is then amplified by a specially designed, fully transistorised, low distortion amplifier and then reproduced through a high fidelity loudspeaker."

In other words, a melody as sweet to the ear as ice cream is to the taste.

How will the broiler rabbit business go?

THERE are so many unknown factors in the raising of rabbits on broiler lines that no one can say how the business is going to turn out. Already there are signs of a rush to get in on the ground floor, and the familiar astronomical estimated growth figures are being mooted—"Within a year and a half the production of broiler rabbits is expected to have risen to an annual rate of 20 m. Within five years the figure may reach 50 m." (*Financial Times.*)

At present, of some 12 m. rabbits annually produced in this country for food, only about 1½ m. can be said to come from the new broiler growers. We are told that the demand for breeding does is such that they are changing hands at three times their value and more. A danger in this is that large numbers of enthusiastic but inexperienced breeders may acquire inferior breeding stock, which will be to their disadvantage when competition becomes severe, as it is very likely to. As a single doe can produce an average of 25 meat rabbits a year (only buck rabbits are at present going for meat, the does are being retained for breeding) and it is thought that strains can be bred to produce 35, the industry is likely to expand very fast if the demand exists.

Demand is one of the major unknown factors, and although sales of rabbits on the present small scale are brisk, the failure of Mac Fisheries' recent attempt to promote the sale of imported Australian rabbits is not very encouraging. A lot will depend on price, and at present rabbit meat costs half as much again as chicken, although this price will obviously come down as production increases.

Desiccated coconut — III

A CORRESPONDENT writes: "Commenting on the need for adequate measures to be taken to ensure that desiccated coconut is prepared under proper conditions of hygiene, the health committee of the Association of Municipal Corporations say they understand the Ceylon parliament approved early last April regulations governing the manufacture, packing and shipping of coconut.

"These regulations are designed to improve the hygiene conditions in the coconut mills, all of which will, in the future, have to be registered with the Ceylon coconut board. Registration will be accepted only if the board are satisfied that the standards laid down in the regulations are being complied with, and registration has to be renewed annually.

"The regulations also require that export licences must be obtained before any coconut can be exported from Ceylon, and it is understood that such licences will be issued only after satisfactory results have been obtained from laboratory examination of samples of the coconut.

"The committee report: 'The various regulations governing both the manufacture and shipping of coconut together with the steps that it is proposed shall be taken for inspection, sampling, etc., appear to be adequate to ensure that in future the product will be satisfactory.

"'Naturally, it will take time to bring the regulations fully into force, but we are informed that all possible steps are being taken to see that the regulations are fully complied with at the earliest possible date. Meanwhile, the intensive sampling and bacteriological examination of all imports of coconut at the ports will be continued.

"'Practically all the coconut imported into this country comes from Ceylon, less than 1% of the total coming from the Philippines or elsewhere. The Ministry have not received any reports or information regarding contaminated coconut received from sources other than Ceylon.'"

Money well spent

FURTHER to our remarks on p. 317 of our August issue about wasting money on sending a man to the moon, we are pleased that President Kennedy has asked for funds for oceanography nearly double what was invested in that field in 1960.

"The seas around us," Mr. Kennedy told Congress, "represent one of our most important resources. If vigorously developed this resource can be a source of great benefit to the nation and to all mankind." Stressing the fact that the seas offer a wealth of food, he added: "They already are a principal source of protein. They can provide many times the current food supply if we but know how to garner and husband this self-renewing larder. To meet the vast needs of an expanding population, the bounty of the sea must be made more available. Within two decades our own nation will require a million more tons of seafood than we now harvest.

"Knowledge and understanding of the oceans promise to assume greater and greater importance in the future. This is not a one-year programme or even a ten-year programme. It is the first step in a continuing effort to acquire and apply the information about a part of our world that will ultimately

determine conditions of life in the rest of the world. The opportunities are there. A vigorous programme will capture those opportunities."

Before the war Japan was one of the few countries seriously involved in fisheries research. Now, some 200 Japanese research vessels range thousands of miles from their native land, investigating currents, temperatures, concentrations of plankton and so forth and gathering indicators of where the fish are. As is well known, the Japanese have been depending on fish as their principal source of animal protein and they not only eat hundreds of varieties of fish, but also many kinds of sea weed. The need for more and better fisheries research is, of course, realised in many other countries.

Only a few kinds of fish of the large number of known varieties are caught. Many parts of the ocean, especially in the southern hemisphere, are scarcely fished at all. Fishing as an industry is far from having been fully developed; it is held, for instance, that the yield of the sea could be considerably increased, merely by "ploughing" the ocean bottom, thus bringing up dissolved substances from the depths to the surface and so providing more food for fish.

Fishery research ships have already paid off in immediate results. A German vessel, the *Anton Dohrn*, has found several new fishing grounds. One bank located near Greenland and yielding red fish, has been named "The Dohrn Bank." A Norwegian fisheries vessel spotted the herring before they reached the Norwegian Fjords; this has enabled the herring season to be extended, and the increased revenue from the larger catch has already paid for the boat.

Is water an ingredient?

MORE control over sugar confectionery and the claim that certain products have weight reducing properties are some of the changes advocated by the Association of Municipal Corporations in a memorandum submitted to the Food Standards Committee for consideration in the course of their review of the labelling provisions of the Labelling of Food Order, 1953, and of other food regulations.

The Association represents all county boroughs in England and Wales, all but one of the non-county boroughs and all save two of the metropolitan boroughs.

Dealing with the present exemptions from basic requirements of Labelling of Food Order, 1953, the Association say that, in general, difficulties do not appear to have been experienced with the exempted foods and the only exemption the Association suggests should be reconsidered is that of sugar confectionery.

It states: "There is some evidence that this exemption has been taken advantage of in the past, and where a list of ingredients has been voluntarily printed on the wrapper and has been incorrect it has proved difficult to sustain objections. It would also be of value if the new Order included a definition of sugar confectionery."

The Association says that it is thought desirable to review the provision of the present Order whereby it is not necessary to include water in the required list of ingredients. This could in some cases lead to misunderstanding over the composition of certain kinds of foods: e.g., fruit juices and tinned soups.

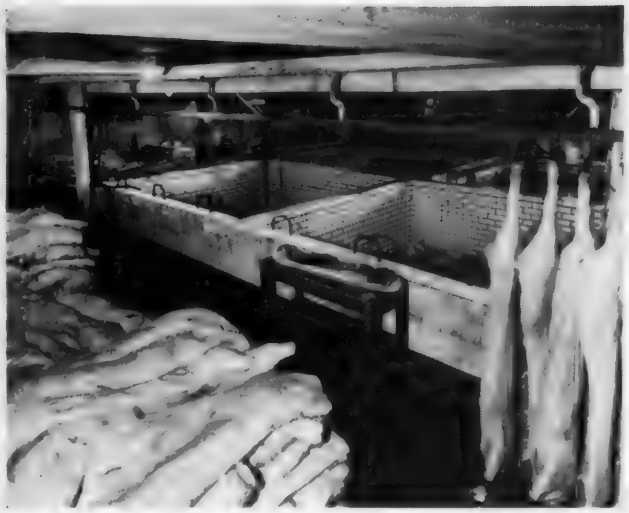
How to pot a cow's head

How does one pot a cow's head? For that matter, why pot a cow's head at all? To all foreigners Englishmen are Englishmen (even though they be Irishmen, as one Indian newspaper quaintly put it), but between Englishmen of the north and Englishmen of the south there is a gulf defined not merely by how they speak but by how and what they eat. The grosser differences in diet of course are well known (one could mention the haggis, but that would be to venture a little too far north, and our Scottish friends might be offended; even though Irishmen be taken for Englishmen by Indians, a Scot is a Scot the world over).

Mrs. Susannah McIver (Scottish, evidently) in 1783 published a cookery book which was destined not to pass into oblivion, for in this year of grace 1961 it was called for the defence in an appeal against a conviction for selling potted meat below the standard required. The appeal was successful; the triumph of ancient culinary wisdom against the might of the law, aided by modern science, should not pass unheeded. What had Mrs. McIver written nearly 200 years ago that caused magistrates in a Newcastle court of appeal to admit defeat?

In a section of her book entitled "How to pot a cow's head" there was, so we are told, a recipe for potted meat which now forms the basis of a Newcastle company's product. This product contains 60·1% meat and 39·9% water. It was contended by the prosecution that the meat content was below what would be expected, but as the prosecution could not produce any nationally recognised standard for the meat content of potted meat and the defence could produce Mrs. McIver's cookery book, the prosecution were batting on a decidedly sticky wicket (or sailing very close to the wind). To clinch the matter, three housewives said they had bought the meat for 25 years and found it to their satisfaction.

It is rumoured that advance orders have already made a new edition of Mrs. McIver's book a sell-out.



(*Left*): **A general view of the curing room at Gaskell Bros., Ltd., of Warrington. In the centre are the four curing tanks; around the walls are stacked sides which have been in the tanks and are now maturing.** (*Right*): **A close-up of one of the curing tanks, where pumped bacon sides are stacked, battened down and then covered with curing brine.**

How Gaskells cure Bacon and Ham

Product improved by adding dextrose to curing brine

Pre-packaging has imposed new requirements on the bacon and ham curer. To improve the quality of their Wiltshire bacon, Gaskell Bros. of Warrington five years ago started using dextrose in their curing brines in place of "Foots" sugar. This article describes the results.

IN an effort to improve the quality of Wiltshire-cured bacon, a firm of curers in Northern England has replaced "Foots" sugar by dextrose in its pumping brine. Five years' experience has shown that dextrose gives a cured bacon with excellent flavour, good colour, improved storage life and improved frying qualities. Coupled with this improvement in quality, it has been found that dextrose is better to handle in the factory, as it is a clean, dry powder which dissolves easily in the brine and gives bacon sides which are free from slime.

Recently the curer has entered the field of pre-packed sliced bacon and ham. Dextrose has been found to be an important ingredient in the special curing brine needed to give a product which will stay fresh for up to three weeks after packaging. The firm in question, Gaskell Bros., Ltd., of Warrington, Lancs., slaughters approximately 1,800 pigs each week. Some are sold whole or as fresh meat joints, but a considerable proportion of the carcases are cured for bacon and ham.

FROM PIG TO RASHER

The story of a pig's conversion into bacon starts in the slaughterhouse. Each day animals are brought in from farms in the area and wherever possible rested before slaughter. This improves the quality of the flesh. The pigs are stunned with electric tongs. Two pads kept constantly moist are placed behind the ears of the animal. As the tongs are closed a 60-volt A.C. current of low frequency is passed between the pads, which is sufficient to knock the pig out.

Whilst still unconscious it is hoisted up by one of its hind legs on to an inclined sliding rail. Quickly the pig is stuck—a knife pierces the main artery, thereby killing it almost instantly. The initial flush of blood flows out into a trough, whence it runs into processing tanks to await conversion into black puddings, etc. The remainder is washed away.

The carcase is now allowed to bleed thoroughly for about three minutes. It is then scalded by being passed through water maintained at a temperature of 140°F. This causes the hair to be loosened without damaging the flesh in any way. A scoop lifts the hot pig out

of the tank and tips it into a dehairing machine which removes all the fine hairs by the rubbing action of a number of blades. A continuous spray of water washes away the hair as it is rubbed off.

A gambrel is now inserted into the hind feet and the carcase is swung on to another rail. Here a final hand scraping is administered. Then into the singeing furnace; this treatment helps to firm the fat and keeps the rind soft after curing.

At Gaskells the furnace totally encloses the carcase. It consists of a vertical metal cylinder divided into two halves and lined with fire bricks. Gas oil is pumped in with steam through the jets at the bottom of the furnace to give a flame along the whole length of the carcase, and all round it.

The furnace opens to allow the carcase to enter whilst still hanging from the conveyor rail. As the doors are closed by a lever the flames automatically adjust to full length and after 20 seconds the carcase is singed to the required degree. The blackened carcase now passes through another scraping machine designed to remove all charred material.

Some hand cleaning is required, however, because no machine has been developed which can remove all the blackened skin from behind the joints and other difficult positions. Jets of water are played on to the carcase both to soften the charred material and to reduce the temperature which has been raised by the action of the furnace.

In the curing room the sides are dealt with, one at a time, by two men. One removes the hind foot while the other pumps brine into the side at various points before they are placed in the curing tanks.

Butchering

At this point the cleansed carcase comes into the butcher's hands. He makes an incision right down the belly of the animal and removes all the guts. When this has been done each animal is thoroughly inspected by veterinary experts to ensure that it is fit for human consumption. In effect, a rapid "post-mortem" is carried out to ensure that no infected or diseased tissue is passed as edible.

The back is now marked down and the carcase is split according to its size and intended purpose; the backbone is removed completely for Wiltshire cure. It is at this stage that the carcase is weighed and graded. After weighing the head is also removed.

All loose bones are sent to glue factories, and certain other parts of the animal are also removed to be sent to by-products' plants. Overnight the sides are cooled to 40°F., which is the correct temperature for curing. This also obviates excessive bacterial growth.

In the Gaskell factory cooling is carried out in a refrigerated room under controlled humidity conditions so that temperature is brought down ready for the final trimming of the sides next morning. This involves the removal of the rib end, the extraction of the aitch bone with a special tool, trimming off all other rough bones with a power saw and a general tidy up with a knife. The side is now ready for cure.

The temperature of the flesh is ascertained by an insertion thermometer—a pointed instrument which is plunged into the thickest part of the side so that the temperature can be checked. For the

A close-up of the pumping needle. At the touch of the lever, pickling brine at 80 p.s.i. is forced out of the holes drilled along the length of the needle.

(*Left*): **Women arranging slices of bacon for pre-packaging. The slices are laid out on a frame and then slipped into an envelope of plastic film.** (*Right*): **Packs of bacon are evacuated and heat sealed on this machine.**

actual curing the tank process is used.

The pickling brines

In the tank curing process, two types of brine are required. For injecting the carcase a pumping brine is prepared freshly for each batch. An immersion brine, into which the carcases are placed, is a mature liquor which is used repeatedly and checked for quality between each application.

The raw materials used are good quality vacuum salt, granulated salt, sodium nitrate, sodium nitrite and *Cerelose* brand dextrose monohydrate supplied by Brown and Polson, Ltd.

The pumping brine is made up in 300 gallon batches. Into a measured volume of water, approximately 800 lb. of vacuum salt are mixed to ensure that a saturated salt solution has been obtained, the brine is prepared by being passed through a saturation tank. This vessel is a rectangular tile-lined tank connected at its base with a small balancing tank. It is packed with granular salt and water is allowed to flow through it slowly so that only saturated brine is passed out. The saturated brine flows from the balancing tank to another tank where other ingredients are added, namely sodium nitrate, sodium nitrite and dextrose. All these ingredients are mixed by aerating the liquid.

When all the solid material has been dissolved the pumping brine is ready for use. It is delivered from the mixing tank by pipes under pressure to the pumping needles, which inject it into the carcase.

The immersion brine used at Gaskells is a long-standing liquor. Although used repeatedly, it is cleaned between each batch and is analysed regularly both by charge hands and also at more infrequent intervals by chemists at the B.F.M.I.R.A. at Leatherhead. A typical chemical analysis shows a salt concentration of 26%, a nitrate concentration of 1·2%, and nitrite content of 0·05%.

Regularly the immersion brine is checked with a salinometer and maintained at 80 in the winter and 90 in the summer. The brine is cleaned by aerating thoroughly, skimming off the precipitated matter and filtering. It is important to keep the nitrite content down because an excess gives a bad colour to the cured sides.

The curing process

In the curing room at Gaskells there are four curing tanks in the centre of the room, and in one corner are sited the brine preparation tanks. Each curing tank is tile lined and sufficiently large to hold approximately 500 sides. The temperature of the room is maintained at 40°F., which is the correct temperature for curing.

Prepared sides are taken into the curing room and treated one by one. A final butchering is given in which the hind foot of each side is removed at the hock. Using a pumping needle, the pumping brine is injected into the carcase at several points under a pressure of approximately 80 lb. per sq. in.

The needle is inserted obliquely into the thick parts of the side, and when the holes along the needle are completely covered by flesh the pumping needle control is operated which causes the brine to be injected. In summer months a mixture of dry salt and saltpetre is stuffed into the blade bone pocket.

Prepared sides are stacked neatly into the curing tanks and between each layer some dry salt mixture is sprinkled. Wooden boards are laid on top of the sides and are held in position by heavy cross members passed under metal hoops built into the top of the tank. Then cleaned immersion brine is pumped over the carcases.

For 96 hours or longer the sides remain in the curing tanks, at the end of which period the boards are

removed altogether. The sides now float to the surface of the brine and it is possible to bring the sides to a place where they can be finally removed.

To enable them to dry out and mature they are then neatly stacked on duckboards in the curing room and allowed to stand for seven days.

Sides to be smoked are hung in a special smoking room; a large cabinet in which smoke produced by the combustion of hardwood is injected under carefully controlled conditions. A smoking unit is situated outside the room and is fed with shavings of oak or other hard woods, but where possible only oak sawdust is used, as this gives the best flavour to the bacon.

The process of smoking may take as little as 24 hours for lightly smoked bacon, or as long as 72 hours for a very well-smoked side. The degree of smoking is controlled by the rate of combustion of the sawdust and by means of dampers in the ventilation system.

When mature, Wiltshire cured sides are wrapped in scrim cloth and sent out to retail shops or wholesalers.

Pre-packed sliced bacon

An increasing number of bacon sides at Gaskells are treated with a special cure, sliced and packaged at the factory. After preparation, the sides are taken to a new packing department.

On a bacon slicing machine the sides are cut down and then, by hand, the bacon slices are neatly arranged on a wire frame and slipped into a transparent pack made of polythene and *Diothene*.

A special machine is used for the evacuation and sealing of the packs. The machine currently in use takes four packets at a time, reduces the contents of air to a pre-determined limit and then heat-seals the open ends. Inspection is required to see that the pack is fully evacuated, sealed and attractively presented. In addition to the usual markings, each packet displays the date by which the product must be consumed if it is to be eaten when in prime condition.

BACON CURING THEORY

It has been stated (Osman Jones, *Food*, 1949) that the conversion of pig flesh into bacon or ham depends on two distinct principles. These are the arresting action of saline matter on the activity of putrefactive micro-organisms and, secondly, the formation of nitroso-hæmoglobin from the hæmoglobin of the flesh.

The saline material acts as preservative for the meat. Distinctive colour is given to the flesh by the formation of the nitroso-hæmoglobin. It is not clear what gives the characteristic flavour of bacon or ham. It is thought by some that the distinctive flavour is due to nitroso-hæmochromogen, a compound formed from the citroso-hæmoglobin by the heat of cooking. However, it is thought that the flavour elements are more complicated than this and may be due to changes in the protein structure in the meat—an idea supported by the fact that the flavour of bacon and ham is improved by ageing under controlled conditions.

In a curing brine there are four components whose complete function can only be guessed. It is certain that the salt inhibits the growth of putrefactive organisms, gives a definite flavour to the flesh and also causes penetration of the pickling liquor into the flesh by osmotic pressure action. The nitrate was put in originally as material on which nitrate-reducing bacteria could work to produce nitrite. However, some people think that in the reduction process oxygen is liberated which inhibits the growth of anærobic putrefactive organisms.

It is clear that the nitrite in the mix is necessary to produce the red colour of meat. In the earlier days nitrite was not added but was produced from the nitrate by bacterial action only. It was an American idea to introduce nitrite in order to speed up the curing because the production of nitrite by bacterial action takes a number of days. The purpose of the sugar, either dextrose or sucrose, is to take the "brashness" from the salt, to give a sweetness to the meat and to give good colour, flavour and odour during frying of the rashers.

It is not clear if nitrate is needed when nitrite is added to the pickling brines. Some work in America suggests that where nitrite is added the nitrate can be left out altogether, without affecting the bacon adversely. However, if nitrate is left out, much more careful control of nitrite in the brine is required, and this would involve analytical work between every batch.

Dextrose in the curing process

Before dextrose was introduced at Gaskells, "Foots" sugar was used at approximately the same rate as sodium nitrate in the pumping brine—that is, approximately 90 lb. of sugar was added to each 300 gallons of brine. In making up the pumping brine it was found difficult to dissolve the sugar completely while the finished cured bacon tended to have a rather dark colour.

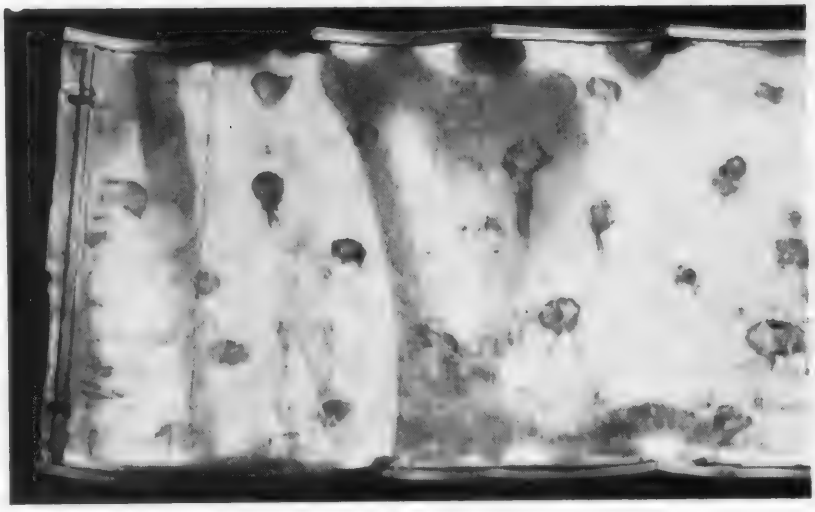
The first advantage noticed when work was undertaken with dextrose was its clean appearance, uniformity in successive deliveries and the easy handling of the dry, free-flowing powder.

In the preparation of the pumping brine no difficulty was experienced in dissolving the dextrose, and the curing foreman was able to prepare the brines more quickly and with the satisfaction that the complete amount required by the formulation was taken into solution.

Assessments of dextrose in the process by the staff at Gaskells shows that it takes the brashness from the salt, so giving a softer and more mature flavour. The colour of the bacon, which had previously been a little dull, was transformed into a brighter red colour which made the bacon look fresher and a little more lean. By contrast the fat looked a little whiter.

The housewife becomes aware of the sugar when the bacon is fried in the pan. Due to slight caramelisation, the bacon gives an

(*Concluded on page* 433)



The inside surface of a can of cherries showing how differential corrosion of the tin surface has resulted in etched " prints " of the fruits where they have been pressed against the metal. This effect might be due to *p*H differences.

Some New Ideas of

The Mechanism of Corrosion of Tinplate Cans by Fruit

By Denis Dickinson*, Ph.D., M.Sc.

This article presents some new explanations of the mechanism of can corrosion caused by fruit in the light of recent discoveries.

IN a general paper[1] on the internal corrosion of tin-plate cans by the fruit and vegetables packed in them, the writer put forward the chemical, physical and biochemical principles that may be involved. Since that paper was written there have been a number of developments which make it desirable to modify or expand some of the explanations given then.

The corrosive activity of fruit is normally much more intense than that of vegetables, a fact that is readily explained by the greater acidity and lower *p*H values found in canned fruit. The types of can used for packing fruit are, broadly speaking, plain cans for uncoloured or yellow fruit, and lacquered cans for red or purple fruit, irrespective of whether the colour seen by the consumer is natural or artificial. The primary reason for using lacquered cans for naturally pigmented fruit is to be found in the chemical interaction of most natural red pigments and traces of dissolved tin, with the formation of blue complexes which render the fruit unattractive when the can is opened. The purpose of the lacquer, therefore, is to prevent the dissolution of tin by interposing a physical barrier between the metal and the corrosive liquid.

* Fruit and Vegetable Canning and Quick Freezing Research Association, Chipping Campden, Glos.

Mechanical damage

Modern lacquering techniques and lacquers have improved the effectiveness of the lacquer film as a barrier and corrosion of the plate has consequently been suppressed. However, there are occasions when mechanical damage to the lacquer film exposes the underlying metal. Mechanical damage of any consequence is only rarely restricted to the lacquer film itself; most usually the underlying tin coating is also damaged, with consequent exposure of the steel base. The corrosion that follows is very often straightforward corrosion of steel by the fruit juice, with the steel providing both anodic and cathodic areas.

Where corrosion begins at a deep scratch, it can often be seen to spread laterally beneath the lacquer, where the normally bright tin surface becomes dull grey, while microscopic examination will also reveal intense anodic attack on the iron, frequently resulting in deep pits that follow the line of the original scratch. The staining of the tin surface, which is clearly visible and which is coincident with a loosening of the neighbouring lacquer, may be thought to be the simple result of the dissolution of metallic tin, and yet it is evident that anodic attack has been concentrated on the exposed steel at the site of the original scratch. It is considered probable that, in these circumstances, the first function of the tin is to provide a depolarising cathode in the form of its oxide film. Reduction of the oxide by hydrogen probably destroys the bonds responsible for the adhesion of the lacquer film over this area, as a direct result of which action the lacquer tends to peel away from the tin on both sides of the original scratch. This, of course, exposes more tin surface, and probably is followed

very soon by local action over the tin surface.

Hydrogen evolution

It is now recognised that tinplate carries a natural oxide film and it appears logical that this film should provide the cathode and the means of cathodic depolarisation in circumstances such as those envisaged. Cheftel *et al.*[2] suppose that stannous oxide is reduced by nascent hydrogen and that tin is deposited in a spongy state upon the metal surface. This would account for the grey stain which is commonly seen over the tin coating where it has been exposed by imperfections in the lacquer. It also accounts for one of the most puzzling phenomena associated with the internal corrosion of tinplate cans—the fact that the measurable hydrogen evolved is always much less than the equivalent of the metals dissolved.

Cheftel *et al.*, considering corrosion in plain cans, represented the series of reactions schematically as follows:

$$\begin{array}{l} Sn \longrightarrow Sn \cdots H \\ Sn(OH)_2 \longrightarrow Sn \end{array}$$

The hydrogen evolved in the first step (dissolution of metal) is oxidised to water in the second step and the net equivalent of hydrogen evolved is nil.

In the case of a scratch in a lacquered can, such as we are at present considering, we find Fe, Sn and $Sn(OH)_2$ exposed in close proximity, and the scheme of things could well be

$$\begin{array}{l} Fe \longrightarrow Fe^{++} + 2H \\ Sn(OH)_2 + 2H \longrightarrow Sn + 2H_2O \end{array}$$

These schemes are doubtless over-simplified, but they serve to establish the idea. They are far more satisfactory than a simple statement that tin, in plain cans, appears to dissolve without the liberation of hydrogen, or that one-half or more of the expected hydrogen in a corroded lacquered can diffuses out through the steel, or reduces natural constituents of the can contents.

Anodic polarisation

If we accept this hypothesis and its implication of abundant depolarisation mechanism for the cathodic areas, it follows that the overall rate of corrosion of the exposed steel base is most probably controlled by anodic polarisation. In a can of fruit the depolarisation of anodic areas in the steel base must be a slow process. The liquid medium is viscous and there are no opportunities for stirring while the can remains in store. Depolarisation must be by diffusion and very slow. Any process that assists anodic depolarisation must therefore be of the greatest importance as an accelerator of corrosion.

It has been found that stone fruits, such as cherries and plums, when canned, sometimes corrode the (lacquered) cans with unexpected severity. This has been found to coincide with the presence in the stones of β-glucosidase activity and of the glycoside amygdalin.[3] If the stones are removed before canning, or if the heat process given to the canned fruit is sufficient to inactivate the enzyme, then accelerated corrosion does not occur.

It is known that β-glucosidase activity in the stone kernels results in the liberation of small quantities of hydrogen cyanide (of the order of 4 to 5 mg./kilo) and it is supposed that this substance acts as an anodic depolariser of the iron. There is evidence also that the CN ion does not accumulate in the can if there is no corrosion process in which it can take part and it is probably converted to formic acid. Any CN liberated during processing or during the early part of storage before anodic polarisation becomes important would be unlikely to contribute to the speed of the reaction. This is fortunate, since it is impossible to avoid stimulation of the enzyme system during heat processing with the result that there is always some CN present at the beginning of storage. It is obvious that the cyanide would be most effective as a depolariser if it were evolved at a rate equivalent to the cathodic corrosion reaction and at a time when anodic polarisation was beginning to slow down the reaction.

Corrosion acceleration

Although residual enzyme activity in canned stone fruits is now known to be an important cause of accelerated corrosion in lacquered cans, it should be pointed out that residual enzyme activity is not dangerous in itself. It can only accelerate an existing reaction; it cannot initiate corrosion. A perfect lacquer barrier would therefore be proof against the enzymic acceleration of corrosion, but it is not to be expected that a perfect film will ever be realised and the practical solution to the problem is a compromise involving a reasonably effective lacquer barrier—to be provided by the can-maker, and a reasonably safe heat process—to be given by the canner.

The acceleration of corrosion associated with continued β-glucosidase activity does not apply to the corrosion of plain cans. This is a reason for the well-established difference of behaviour of white cherries and golden plums when packed in lacquered cans or in plain cans. The normal shelf-lives of these fruits in plain cans are about double those in lacquered cans. The complete lack of acceleration by cyanide in plain cans rules out iron as anode to any important extent. The anode in the plain can is normally provided by the exposed tin surface.

Anodic tin

Since tin is more noble than iron in the classical series there has always been some speculation on the physical chemistry of the processes involved in the corrosion of a tin-iron couple as provided by tinplate. The tin coating on tinplate is never perfect and the underlying steel is exposed at points or even over quite large areas which have been subjected to mechanical strain. Nevertheless, the exposed iron does not normally corrode as anode. Cheftel *et al.* have worked out from first principles that tin should be anodic to iron on account of the low solu-

bility of $Sn(OH)_2$. They calculated

$$E_{Sn} = -0.056 - 0.06\ pH$$
and
$$E_{Fe} = -0.04 - 0.06\ pH$$

Many times previously, and using a variety of techniques, it has been shown that tin is anodic to iron in media corresponding to fruit juices. However, it was thought useful to put this theory to further experimental test by exposing partially de-tinned strips of tinplate to the corrosive action of buffered gels. The author has made experiments using agar gel buffered with M/200 citrate to *p*H values between 3 and 7.

Strips of tinplate, one half de-tinned with antimony trichloride-HCl solution, were laid in *Petri* dishes, covered with molten agar gel of the required *p*H and cooled rapidly. After several hours at room temperature (sometimes overnight, according to *p*H) the *p*H value was measured by means of a probe-type glass electrode at three places in the dish—close to the iron, close to the tin and in the body of the gel. Indicators—ferroxyl, phenolphthalein, methyl orange—were added to the gels as an aid in following the course of the reactions.

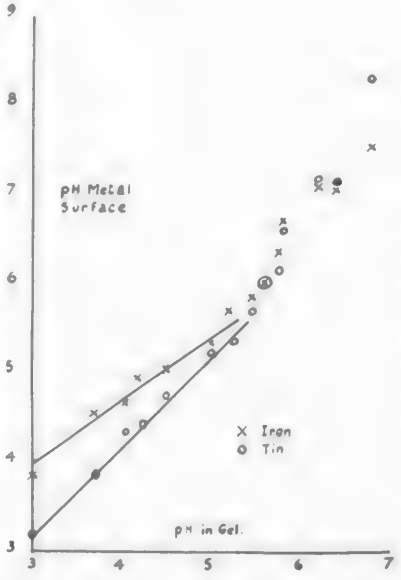
After several hours, local action became of increasing importance, but it did not usually obscure the main effects. It was quite clear that tin formed the anode in the first place, and hydrogen was evolved at the iron surface. The gas was trapped in the gel and was therefore clearly visible.

Since the potentials of both metals depend on *p*H, it would be expected that the electrode reactions would cause *p*H changes which would eventually stop the electrolysis between tin anode and iron cathode; the difference between the calculated potentials is only 0·016 V at the same *p*H value. If, therefore, a difference of *p*H of 0·25 develops between the media covering the anode and the cathode, the potentials should become equal and the reactions should stop. The results of the above experiments showed that the truth is more complicated. In Fig. 2, the *p*H values close to the metals are plotted against the *p*H values of the gels. It is assumed that equilibrium had been attained in each instance. These results show that the *p*H difference necessary to stop electrolytic corrosion between tin and iron in a citrate solution depends on *p*H value, and it seems reasonable to suppose that, although the electrode potentials of tin and iron are both dependent upon the *p*H of the medium and directly proportional to it (below *p*H 5·5), the constants involved are not the same for the two metals. As a result there is, in fact, an interchange of function at about *p*H 6.

Below *p*H 6·0, however, which applies to most canned fruits and vegetables, tin is normally the anodic metal of the tin/iron couple, although the difference in electrode potentials is so small in the *p*H range 5 to 6 that a small local difference in *p*H value may cause a reversal of potential.

From the experimentally determined values, it is possible to calculate the apparent dissociation constant (K) of ferrous hydroxide obtaining at each *p*H value. For example, at *p*H 3·2

$$E_{Sn} = -0.056 - 0.06 \times 3.2$$
$$= -0.248$$



This graph shows that the *p*H difference necessary to stop electrolytic corrosion between tin and iron in a citrate solution depends on the *p*H value of the solution.

The *p*H value close to the corresponding iron surface at equilibrium was 4·0, from which

$$E_{Fe} = E_0 + 0.03 \log[Fe^{++}]$$
$$= E_0 + 0.03\ (\log K - 2 \log[OH^-])$$
$$= E_0 + 0.03 \log K - 0.06\ (pH - 14)$$
$$= E_{Sn}$$

Generally,

$$\log K = \frac{E_{Sn} - E_0}{0.03} + 2(pH - 14)$$

and in this particular instance

$$\log K = \frac{-0.248 + 0.44}{0.03} - 20$$
$$= 0.04 - 14$$
$$K = 2.5 \times 10^{-14}$$

The following values have been calculated

pH of Fe surface	$[\blacksquare\blacksquare K(Fe[OH]_2)$
4·0	2.5×10^{-14}
4·5	1.0×10^{-14}
4·7	6.3×10^{-15}
5·05	2.5×10^{-15}
5·5	2.0×10^{-15}
7·1	4.0×10^{-16}
7·55	2.0×10^{-17}

The value used by Cheftel in calculating the corrosion potential of iron between *p*H 5·5 and 11·0 was 1.65×10^{-15}. Within the *p*H range 5·0 to 7·1 the present results agree closely with this value, but it appears that at lower *p*H, and possibly also at higher *p*H, the effective dissociation constant is different, as might well be expected. Any ion that causes a change in the apparent K value will, of course, affect the corrosion potential of iron.

Cathodic tin

During recent years the most common abnormal instances of corrosion of cans that have not had an obvious explanation have concerned fruit in plain cans in which there has been severe localised corrosion of exposed steel. In such cases it appears that there has been a true reversal of polarity, with the tin acting as cathode. Some other factor might have intervened to protect the tin against anodic attack.

It is known that traces of organic sulphur compounds are capable of forming thin, highly resistant sulphide films over a tin-

(*Concluded on page 433*)

(*Left*): **The soil is prepared by deep-ploughing and harrowing 6-8 months before planting. After fumigation, strips of black paper 32 in. wide are laid on the soil by the machine shown here. The strips prevent weed growth and retain heat and moisture.** (*Right*): **Pineapple slips being planted. The planter pokes a hole with a special implement through the edge of the paper strip and inserts a slip into the soil. The paper is marked to indicate where the slips are to be planted. An experienced worker can plant about 8,000 slips a day, nearly half an acre.**

The Pineapple Industry of Hawaii—I

Canning Hawaiian Pineapple

By W. V. Cruess*

Pineapples are a $125 million industry in Hawaii. The author recently saw the growing and canning of pineapple during a visit to Hawaii. In this article, the first of two, he describes the growing and harvesting of the fruit, how they are canned, and the work of the Pineapple Research Institute.

GROWING and canning of pineapple is one of the three most important industries of Hawaii, the other two being the cane sugar industry and the tourist trade.

It is not definitely known when pineapple was first introduced into the Hawaiian Islands. Its presence was first recorded in 1813. It did not become commercially important until about 1883. Captain John Kidwell came to Hawaii in 1882 and in 1886 succeeded in importing the Smooth Cayenne variety from Central America. It is the variety grown at present for canning and other purposes. It is of large size, seedless and of excellent canning quality.

A cannery was started in 1892, but was unsuccessful. Jas. D. Dole, "father of pineapple canning," established a cannery in 1903. It became very successful and was the forerunner of the present mammoth Dole, Hawaiian Pineapple Co., Inc. "Jim" Dole died about a year ago.

There are nine canneries in Hawaii and eight owners; as one of the companies, Libby McNeill and Libby, operates two canneries. The "big three" are Dole, Hawaiian Pineapple Co., Ltd., Libby McNeill and Libby Co., and California Packing Corporation, all with headquarters in Honolulu. Others are: Hawaiian Canneries Co., Ltd., Hawaiian Fruit Packers, Ltd., Kauai Pineapple Co., Ltd., and Grove Farm, Ltd., all on Kauai Island; and Baldwin Packers, Ltd., and Main Pineappe Co., Ltd., both of Main Island.

Competition is growing

While much of the sugar cane in the Islands is irrigated, pineapple requires less water than cane and is usually grown at a higher elevation where rainfall is more abundant; consequently most of the pineapple is grown without irrigation.

Hawaii is feeling the competition with other producing areas, as evidenced by the fact that twenty-five years ago it furnished 95% of the U.S. requirement, whereas it now provides only 80%. Formosa, Malaya, and the Philippines are especially competitive with Hawaii. Their lower labour costs give them a powerful advantage.

Unlike the fruit canneries on the U.S. mainland, the Hawaiian pineapple canneries are also the principal growers. The estimated

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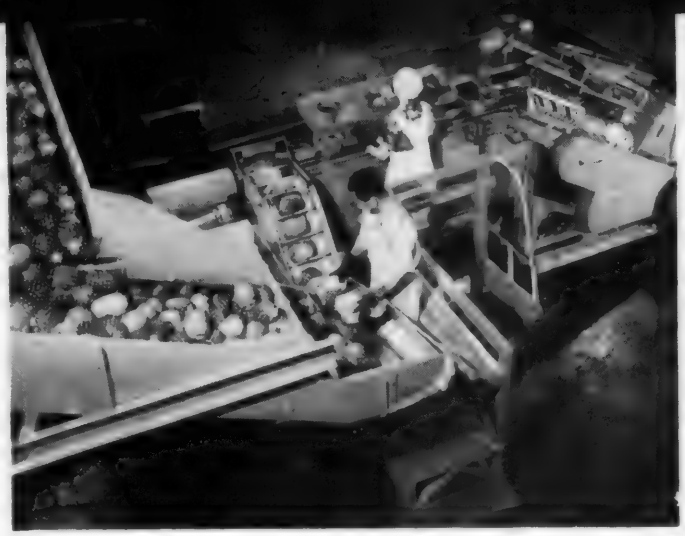


(*Left*): **Feeding a ginaca machine.** (*Right*): **Trimming peeled and cored pineapples.** (*All photos except one by courtesy of Dole, Hawaiian Pineapple Co.*)

value of the 1958 pack was $124,000,000 and for that of 1959, $122,500,000. The total payroll in 1959 was $38,554,000.

According to a 1960 report of the pineapple industry there were in 1959 2,650 year-round employees on the pineapple plantations and seasonal employees 2,963, or a total peak employment of 23,705. For the canneries the figures were: year-round 1,271 and seasonal 12,603 employees. The plantation employees are usually housed in permanent villages on the plantations.

Market surveys in recent years show that consumers are eating less pineapple per capita than formerly. Thus, according to the report mentioned earlier, canned pineapple received $0·31 of every $100 spent in grocery stores in the U.S. in 1948; the figures for other recent years were $0·31 for 1950, $0·26 for 1955 and $0·21 for 1957. In other words, marketing is a very important problem for the Hawaiian pineapple industry. For comparison the corresponding figures for canned peaches were $0·36 for 1948, $0·37 for 1950, $0·36 for 1955, and $0·35 for 1957.

As one effect of this situation, one large canning company is, according to a recent news account, drastically reducing its acreage of pineapple.

The total U.S. consumption of canned pears, fruit cocktail and peaches has increased much more than of canned pineapple in the last decade. Prices of canned pineapple during this period have remained relatively stable or have decreased, while the prices for canned pears, peaches and cocktail have risen.

The increase in production of canned pineapple juice since 1930 has been rather spectacular, although the growth of frozen orange concentrate has been even more rapid; from practically nothing in 1947 to about 89,000,000 cases in 1956-57 (the usual 3+1 concentrate converted to beverage strength). Its present production is about five times that of pineapple juice. One large company has marketed frozen pineapple juice, but it has not become very important commercially.

The Industry's Growth

shown in yearly outputs of canned pineapple cases

1903	1,633
1910	401,035
1920	5,163,772
1930	10,929,855
1940	8,200,044
1950	11,314,453
1959	17,676,613
1960	17,286,739

The Pineapple Research Institute

The P.R.I., as it is popularly known, is a research organisation supported entirely by the pineapple companies of Hawaii. It has six research departments, namely, Agricultural Engineering, Agronomy, Chemistry, Entomology, Plant Breeding and Plant Pathology. The Director of P.R.I. is Dr. R. L. Cushing.

Research by P.R.I. scientists has resulted in several accomplishments that have greatly benefited the industry of the Islands. Among these have been development of chemical weedkillers (herbicides), improved methods of applying fertiliser, improved methods and materials for insect control, new materials for soil fumigation to kill nematodes, chemical sprays for forcing pineapple plants to flower, development of special machines for field operations and development of improved laboratory methods for determining the nutritional needs of the pineapple plant.

A recent very important result of P.R.I. research is the discovery and development of an inexpensive and very rapid method of converting pineapple plants into ensilage after the crop is picked. The plants are chopped by ensilage cutter into short pieces. These are placed in a deep pile near the pineapple field and "tramped" (compacted) by a track layer tractor driven back and forth over the pile. Within

48 hours the pineapple waste is converted by fermentation by micro-organisms into sweet-smelling and sweet-tasting ensilage. There is a ready market for this product to the dairies of the islands.

The Pineapple Research Institute at Honolulu. (*Courtesy P.R.I.*)

GROWING and HARVESTING

Although it is a fruit, pineapple does not grow on a tree, but on a plant whose many (40-50) long, sharp leaves grow in a spiral around a short central stalk. The plants reach at maturity a height of three to four feet.

New plants, usually "slips" which grow out from the pineapple stem near the base of the fruit, are planted in soil which has been prepared 6-8 months previously and which has been fumigated. About 15,000 to 18,000 slips are planted per acre. The fruit, which at maturity is about the size of a football, begins to ripen 18 to 24 months after planting. During the period of growth the plants are carefully tended. Because of the unavailability of iron in the soil of Hawaii, the plants are regularly sprayed with a 1-2% solution of ferrous sulphate by means of a truck or tractor mounted rig comprising a tank and two spray booms, one on each side, extending about 50 ft. The booms carry a large number of spray nozzles pointing downward.

Fertilisers are necessary and are applied beside the plants or as sprays on the leaves. Leaves are taken regularly for analysis in the canneries' laboratories to determine fertiliser requirements. Normally, the plantations are on a four-year cycle, that is four years between plantings. This cycle permits growing and harvesting of the first "primary crop" and one ratoon crop. If two ratoon crops are grown the cycle is five years. However, the second ratoon pineapples are small and may be of inferior quality. Usually only one ratoon crop is grown. When the primary crop is removed one or two suckers per plant are left to produce the ratoon fruit. About one year is required to grow the ratoon pines to maturity.

Harvesting

Usually, nearly two years after planting the first fruit ripens, but some may ripen in less time. As not all of the fruits ripen at the same time, the field must be harvested several times.

The harvester is a tall, massive, motorised piece of equipment beneath which a large truck is driven. On the truck is a large metal bin that will hold several tons of pineapple. Extending at a right angle from one side of the harvester is a boom carrying a conveyor. As the machine progresses very slowly through the field, pickers walk behind the conveyor and pick the ripe fruit, which they have learned to recognise by experience. The ripe pines are picked by sharply bending the fruit over until it snaps off the stem of the plant. The crown is removed by striking the pine sharply against a steel guard rail which is attached to the conveyor.

The pineapples are then placed in the conveyor, which delivers them by belt to the bin on the truck. When the bin is filled the truck drives to the cannery and is replaced by another truck with an empty bin.

The Dole, Hawaiian Pineapple Co., Ltd., grows much of its pineapple on the island of Lanai, about 60 miles from Honolulu, located on Oahu Island. The filled bins are loaded on to barges on which they are transported to Honolulu harbour and unloaded at the cannery.

Shortly after harvesting, planting material (slips, crowns and suckers) is collected from the plants and one or two suckers per plant are left, as previously mentioned, to bear a second crop called the "first ratoon crop." The pineapples of the ratoon crop are usually smaller than those of the first crop and more of the crop is used on that account for juice and crushed pineapple than is the case with the first crop.

The principal harvesting season occurs during the summer months, during which the canneries are in operation 24 hours per day. During the other months relatively small amounts of fruit ripens. It is picked and canned, the canneries operating only three or four days per week. During the author's visit in December and January only two of the large canneries in Honolulu were in operation on a three days a week basis; the fruit of a third cannery went to the other two establishments. During the principal harvesting

season many temporary employees are taken on by the canneries. These to a large extent are students. Vacation is scheduled to permit them to work in the canneries during this period. The Dole, Hawaiian Pineapple Co., employs 7,800 persons during the peak season. It annually packs more than 275,000,000 cans of pineapple products and produces nearly 40% of the Hawaiian output of canned pineapple products. More than 3,000,000 pineapples have been delivered to the Dole cannery in Honolulu in a single day, according to a booklet published by the company. The author was told that the capacity of the huge Libby, McNeill and Libby cannery in Hawaii is 150-160 tons of fresh pineapple per hour, or about 1,800 to 1,900 tons per 24 hours. In other words, the canneries in Honolulu have very great capacity.

The Dole, Hawaiian Pineapple Co., Ltd., now manufactures its own cans in a plant adjacent to the cannery. The empty cans are delivered to the canning lines in the cannery by conveyors. The other two large canneries in Honolulu purchase cans from the can manufacturers.

CANNING

The loaded bins are handled by lift truck of the "straddle truck" type at the cannery. The operations at the cannery are, in brief: unloading the bins; washing the pineapple; size grading; peeling; removal of ends and coring; trimming and inspecting; slicing; quality grading and canning; syruping; vacuumising; sealing the cans in vacuum or in "steam flow" seamers; processing the cans; cooling the cans.

In two of the large canneries in Honolulu the pineapples are dumped by machine from the bins on to a broad conveyor at or near the cannery; the other cannery unloads and washes the fruit at some distance from the cannery and conveys the washed fruit to it.

Washing is by powerful sprays of water as the fruit is being conveyed. Usually at least two spray washings, often three, are given, to remove dust, insects, spray residues and other surface materials.

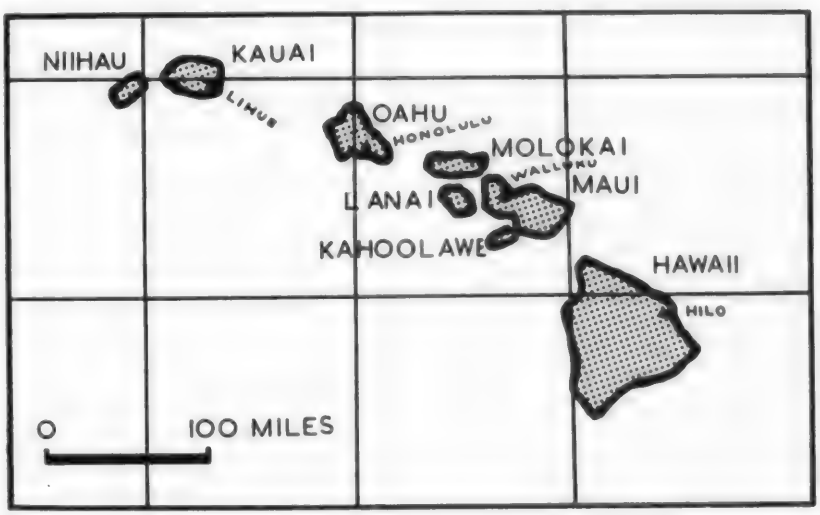
The pines are next graded for size by diverging, downward sloping roller graders. Three to five size grades are usually made, the purpose being to furnish pines of fairly uniform diameter to each ginaca machine.

Ginaca machines

From the size graders the pines are conveyed to the ginaca machines, one size grade to each machine. The ginaca was invented and developed in the early days of the industry by Henry Ginaca, an employee of the Hawaiian Pineapple Co., to avoid the slow and costly preparation then in use.

The ginaca cuts off the stem end and the crown end of each pineapple; slits the skin (usually called the "shell") down two opposite sides; cuts out a cylinder of fruit by means of a cylindrical knife similar in appearance to an oversize cork borer; removes the core as a solid cylinder by means of another "cork borer" coring knife; giving a cored cylinder of fruit, a cylindrical core, two halves of waste skin or shell and two ends.

The machine separates the skins and ends from the peeled fruit and the cores from the cylinders of peeled, cored fruit. The two halves of the shell or skin are automatically scraped twice by a device called the eradicator. The first scrapings are used for crushed pineapple and the second scrapings are used for juice production. The first scrapings are carefully sorted to remove pieces of shell or other material unsuitable for crushed pineapple. The waste goes by conveyor to the by-product plant, the cores to the juice line, and the peeled and



Facts about Hawaii

- ★ Its six major islands are: Hawaii, Oahu, Lanai, Molokai, Maui and Kauai.
- ★ Total land area is 4,099,840 acres.
- ★ Total arable land area is 464,580 acres.
- ★ Cultivated land totals 312,390 acres.
- ★ Total in pineapple is 74,800 acres distributed among 13 plantations on all islands except Hawaii.
- ★ Honolulu is on Oahu.

cored cylinders are automatically conveyed to the trimming tables. The waste skins and ends constitute 30% or more of the weight of the fresh fruit. A ginaca can handle about 105 pines per minute. The largest company in Honolulu has 48 of these machines.

Trimming and sorting

At the trimming table the cylinders are carefully inspected and trimmed by experienced women who also sort out the few pineapples that will discolour in the can. Such pines have a faint off-odour and slight off-colour (pink), caused by bacteria, that experienced girls can detect. The outward appearance of these fruits is more or less normal. The few small dark brown or black spots or "eyes" that were slightly below the depth to which the ginaca peeling knife extended and any other visible defects are removed with sharp knives.

The girls who work at the trimming tables and at the canning tables, also all other workers whose hands come in contact with the pineapple flesh must wear rubber gloves to protect them from the powerful proteolytic enzyme, bromelin, present in fresh pineapple flesh. The tourist, after eating generous portions of fresh pineapple for the first time, may be puzzled because his lips, tongue and other mucous tissue of his mouth has become very sore. He may even fear that he has a case of trench mouth! The bromelin of the fresh fruit, like the ficin of unripe figs, attacks the mucous membrane. However, the soreness in the "neophyte's" mouth disappears within 24 hours. As the heat used in canning destroys the enzyme, canned pineapple does not affect the mucous membrane adversely.

Slicing

From the trimmers the pines are conveyed through sprays of water that remove loose fragments of flesh and to and through the slicing machines that cut the cylinders transversely into circular sections. This is done by very sharp curved knives. The machine, by a so-called geneva motion, places the pineapple in position where it is held in a stationary position for a moment while the knives revolve and cut the fruit neatly into "circles" commonly known as slices. The segments (slices or sections) are customarily $\frac{1}{2}$ in. in thickness for No. $2\frac{1}{2}$ cans, and 25/64 in. in thickness for cans of 2T size.

There are two diameters of slices, namely, No. 2T can diameter and No. $2\frac{1}{2}$ can diameter. The pines harvested during the winter months are often small and the slices therefore are usually of the No. 2T diameter.

From the slicing machines the sliced fruit is conveyed automatically to the canning tables, where women wearing rubber gloves sort the fruit for colour and quality as they place the slices in cans. The pineapple is a compound fruit made up of many individual small fruitlets attached to the core. The fruitlets at the bottom ripen first and those near the top last. The slices that have been located near the top of the pineapple may be lighter therefore in colour than the slices from nearer the bottom of the fruit. The yellow slices and the white to light coloured slices are canned separately for uniformity of can contents. Both are of normal composition and flavour.

The canners also sort for grades, these being *Fancy*, *Choice* and *Standard*. Broken slices, other fragments and slices that are too thin or too thick are sorted out and transferred to the crushed pineapple or juice departments. The canners place the slices in the cans, after which they are automatically conveyed or trayed and delivered by hand truck to the vacuumising, syruping and seaming department, the different grades being kept separate. Each can is prevacuumised as described in the following paragraph.

Pre-vacuumising of cans

The filled cans enter and leave the pre-vacuumising chamber by means of automatic valves or ports that prevent loss of vacuum in the pre-vacuumising chamber

Spraying pineapple plants with ferrous sulphate solution from a truck-mounted spray rig and 50 ft. spray booms carrying nozzles which distribute the solution over the plants.

Harvesting pineapple for canning. The harvester moves forward slowly through the field and the workers walking behind pick the ripe fruit and place them in the conveyor.

during transfer. The cans are subjected to a vacuum of 25-26 inches of Hg. for 5-10 seconds. This operation removes the air from the tissues and changes the appearance of the slices from chalky to translucent or semi-translucent, which results in a more attractive and more uniform appearance.

The cans are then automatically filled with syrup made up of by-product syrup (described later), water and cane sugar. In one plant the by-product syrup made from waste peels and ends is of 50° Brix, in another plant it is 65° Brix. Cane sugar and water are added to give the desired Brix degrees of the syrups for the various grades of canned pineapple.

For *Fancy* grade in one large cannery the "going-in" syrup is 40-50° Brix, depending on the sugar content of the fruit, fill of the can and other factors. The aim is to secure a fairly uniform cut-out Brix degree after canning and processing. (See paragraph on laboratory examination.) For the *Choice* grade one cannery uses syrup that varies from 30-40° Brix and for the *Standard* grade 20-25° Brix.

The Brix degree of the canned product is determined by passing the fruit and syrup through a laboratory size "blendor," followed by taking a refractometer reading on the "blended" sample. The rapidly revolving knives of the blendor disintegrates the pineapple flesh into small particles and the refractometer reading gives the soluble solids content of the mixture, which will be the average soluble solids content of the fruit and syrup after canning and storage for a sufficient time (several months) for the fruit and syrup to come to equilibrium.

Sterilising and cooling

After syruping the cans are sealed either in a vacuum seaming machine or in a steam-flow automatic seamer operating at atmospheric pressure.

The sealed cans are heat processed (sterilised) in a continuous unit similar to that used on the mainland of the U.S.A. for other canned fruits. In one plant the cans are heated at 210°F. in a continuous processor for about ten to twelve minutes, depending on size of can, to heat the contents to 190-195°F. Pineapple should not be overcooked in the can.

The heat processed cans are thoroughly cooled in water in one of several ways. In one plant the cans are conveyed up an inclined trough by belt that causes the cans to spin as they travel. Cold water enters the upper end of the runway and the spent warm water escapes to the waste water line at the lower end of the runway. Cooling is very rapid.

In another cooling device the cans are conveyed in a spiral rotary conveyor similar in appearance to the well-known "cooker" used in mainland canneries for heat processing canned fruits. This cooler, too, is rapid and efficient. Cooling is by sprays of cold water.

The cans and contents are cooled to about 90-100°F. They are usually allowed to dry and cool to room temperature on trays in a large cooling area of the plant. If cooled to too low a temperature the surface of the cans may remain wet and rusting may result as the air humidity is high. If cooled insufficiently colour and flavour may suffer.

In addition to circular slices some of the fruit is made into "tidbits" but cutting the slices radially into segments to be canned as such or to be canned in No. 10 cans for recanning on the mainland in fruit cocktail. Chunks are made by first cutting thick "circles" (slices) and cutting these in turn radially.

Laboratory control

Some cylinders are cut longitudinally into long sections called "spears." These are more common in the Malayan product. Some of the fruit is also cut into small cubes or "diced" pineapple. Other products are the crushed pineapple and the canned juice.

Close laboratory quality control is maintained in all pineapple can-

neries. Frequent sample cans are taken from the line during the day and examined in the laboratory. The soluble solids content is taken by refractometer on the "blended" contents of the can as previously described.

Samples of fresh pineapple are analysed in the laboratory. Also samples of leaves are analysed to determine whether fertiliser is needed, or whether there is need for trace elements such as zinc, manganese, copper or molybdenum. Raw materials such as fertilisers, insecticides, iron sulphate, etc., are also examined for use of the field department.

Crushed pineapple

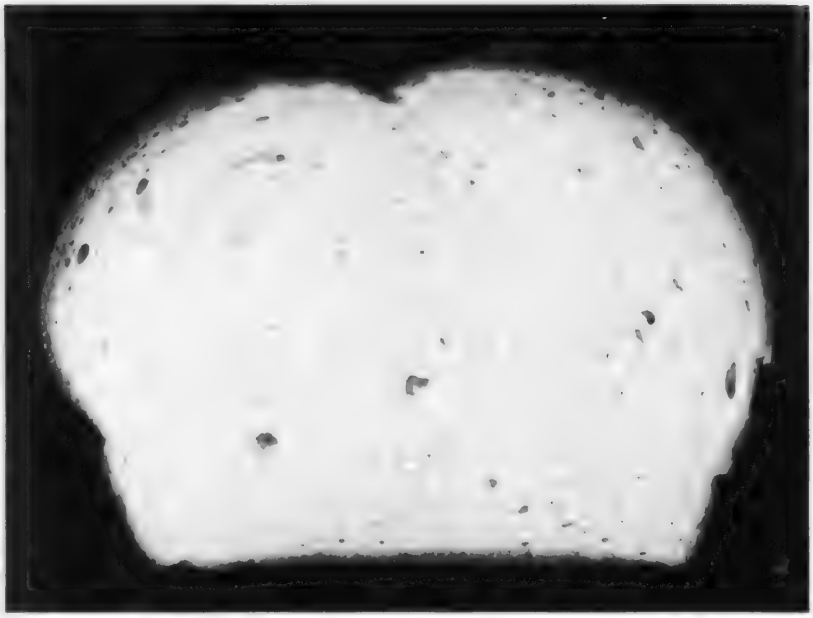
Crushed pineapple is made from broken slices and the carefully sorted material (scrapings) from the first scraping (eradication) of the shells (halved skins). This raw material is passed through a shredder that cuts the fragments into small pieces. Considerable juice accumulates in this operation and is drained off the crushed fruit in order that the latter will not be too "sloppy" after canning.

To the drained crushed fruit is added syrup of 60° Brix and the mixture is heated in a continuous steam jacketed flash pasteuriser or in a large steam jacketed kettle with constant stirring. It is canned hot at 190°F. or above, the cans sealed and cooled at once in one of the manners previously described.

After canning the desired soluble solids content is about 24% as determined by refractometer on the "blended" sample. Some crushed pineapple is canned solid pack in No. 10 cans without added sugar for use by jam manufacturers, bakers and other commercial operators. The sweetened canned crushed pineapple is popular for use in the home as it is as a dessert or in pies, puddings, gelatin desserts, ice cream, etc.

Plain tin plate rather than enamelled plate is used in making cans for pineapple products, as in enamel lined cans the products darken. In plain tin they retain their original colour.

(To be concluded)



Cut surface of 1¾ lb. Coburg loaf produced by the Chorleywood bread process within 1½-2 hours of starting work.

New Mechanical Bread Process Cuts Costs

A NEW batch method of producing good quality bread and small goods developed by the British Baking Industries Research Association is claimed to achieve great reductions in time and cost. The process eliminates bulk dough fermentation and involves intense mechanical working of the dough to a set degree, oxidising treatment and slight recipe adjustments. It is claimed that the bread produced compares favourably in every respect with conventional bread and that it has none of the undesirable characteristics usually associated with a no-time dough process.

The method can be used by every baker whatever his scale of production.

Among the varieties which have been produced at the Association's laboratories at Chorleywood are standard tin bread, batch bread, wheatmeal, wholemeal, bloomers, Coburgs, Vienna bread, milk bread, soft rolls and buns. The saving in production time is illustrated by the fact that, with the exception of batch bread, any of these varieties can be produced within 1½ to 2 hours of beginning work. Even batch bread may be produced in an overall time of 2½ hours.

The saving in space resulting from the elimination of bulk fermentation is considerable. Temperature and humidity control of dough rooms become unnecessary. There is an increase in yield, partly because fermentation and evaporation losses are eliminated, and partly because extra water and yeast are needed.

The net gain should be about 6s. 10d. per sack of standard bread, and correspondingly higher for speciality breads.

Consumer preference trials, using panels of 40-45 people, and comparing bread from the process with conventional, fermented bread, revealed no detectable differences between the two.

Members of the Research Association are being given full details of the process in a report which is now ready and for which they are invited to apply. The report also includes technical details of the system used to measure the work expenditure needed and a discussion of the legal position on the use of oxidising agents.

Microscopy for the Food Technologist

Sections and Section Cutting—II

By S. M. Charlett, F.R.M.S.

The concluding part of this article deals with the automatic microtome and describes how sections are prepared and how they are cut. As pointed out last month, much information is published on the microscopical appearance of food but comparatively little on the techniques of microscopy.

AUTOMATIC MICROTOME: PREPARATION OF SPECIMENS

THE preparation of specimens for sectioning on this type of microtome is more complex than in the previous methods described, and adherence to detail is important. The extreme thinness of the sections makes it necessary to ensure that the supporting agent, which is usually paraffin wax or similar material, is distributed evenly throughout the specimen, and not just around the outside as in the case of hand sections.

1. Fixation

The actual preparation is divided into well-defined steps, each with its particular object. The first step is the fixation of the specimen. The aims of fixation are several and are as follows:

(a) to fix the cell contents in as life-like a condition as possible in such a way as to allow them to be subsequently treated without further change;

(b) to make the specimen resistant to the changes of osmotic pressure to which it will be subject in subsequent treatment;

(c) to alter the refractive index of some of the cell contents and so make them more easily distinguished from other parts of the specimen;

(d) to harden the tissue in such a way as to allow it to withstand the strain of being cut, without becoming distorted;

(e) to affect chemically the tissue and to allow it to accept and retain certain stains.

These may be summed up in a short phrase by saying that the object is to prevent any post mortem change in the tissue, and to render it suitable for subsequent histological treatment. Fixation sometimes creates peculiar effects known as artifacts, which produce microscopical pictures which are not quite true to life and only care and attention to detail will reduce this possibility to a minimum.

Fixatives

In the more intricate microscopical techniques the process of fixation involves the use of more than one reagent, but as the technologist is only concerned with the more general principles and methods, only fixatives of a general nature will be discussed here. The main fixatives of a general nature are:

(a) *Formalin*. This is the name given to a 40% aqueous solution of formaldehyde. For use as a fixative the formalin is diluted to give a solution containing 5% formaldehyde.

(b) *Mercuric chloride*. This is generally held as a stock solution of saturated mercuric chloride which is diluted 1:20 with distilled water for use as a fixative. When this reagent is used the specimen treated must be washed in running water for 24 hours after the fixation treatment is finished, and finally treated with a dilute iodine solution to remove all traces of the mercuric chloride. If this precaution is not taken any residual traces of the latter will interfere with subsequent treatment.

(c) *Osmium tetroxide*. Used as a 1 or 2% solution primarily in the treatment of fatty materials. The solution should be stored in the dark to avoid deterioration.

(d) *Picric acid*. This is a widely used reagent, and is one of the basic constituents of some of the more complex fixative solutions. When used alone it is generally employed as a saturated solution. It is a good fixative but may tend to produce artifacts in a specimen which contains much protein as the acid will cause grainy precipitation of such substances.

(e) *Acetic acid*. Another very useful general fixative which is an ingredient of the more complex fixatives. When used alone it may produce swelling in material containing much collagen, and this tendency is usually reduced by combining the acetic acid with mercuric chloride in a common solution; the acid counteracts the shrinkage sometimes caused by the mercuric chloride, and the mercuric chloride minimises the swelling which may occur when acetic acid is used.

Fixation technique

The general technique of fixation is quite simple. The specimen to be treated should be as fresh as possible, and should be cut into cubes of about 1 $cm.^3$ The cubes should then be immersed in the fixative for 8 to 10 hours. The selection of fixing agent depends on the worker and details cannot be gone into here; at the end of this article are given the titles of several useful books which deal with the subject more deeply if the reader wishes to go further into it.

At the end of the fixation period the tissue should be well washed in running water; the best way of doing this is to tie the specimens

loosely in a thin muslin bag which is then hung so that it is well immersed in a beaker into which fresh tap water is continuously running. This should last for about 12 hours, except in the case of a mercuric chloride fixative where the washing period should be at the least 24 hours.

2. *Dehydration*

The next stage in the preparation of a specimen in which wax is to be used as a supporting agent is dehydration, which is essential because water will not mix with paraffin wax or other similar agents.

This stage is very important. The water must be completely removed, otherwise the specimen may be ruined, but the process of removal must be carefully controlled. If the water is extracted too quickly, then the strain set up within the tissue may severely damage it; on the other hand, the process must be no longer than necessary otherwise the specimen may be excessively hardened. The following procedure will give satisfactory results:

1.	Remove from fixative and wash	
2.	Immerse in 15% alcohol	½ hour
3.	Transfer to 30% alcohol	½ hour
4.	Transfer to 50% alcohol	½ hour
5.	Transfer to 75% alcohol	½ hour
6.	Transfer to 90% alcohol	5 hours
7.	Transfer to absolute alcohol	12 hours
8.	Transfer to fresh absolute alcohol until next stage, approximately two hours	

Section of heart muscle (horse) x 150

Absolute alcohol is very expensive and hygroscopic, thus reducing its effectiveness as a dehydrating agent. Other reagents have been employed by various workers, butyl alcohol and isopropyl alcohol are examples, but the writer has found that benzyl alcohol is a very useful reagent and simplifies dehydration. The steps with benzyl alcohol are the same as with ordinary alcohol up to the point where the specimen is transferred to 95% alcohol. From 95% alcohol the specimen is transferred direct to benzyl alcohol and left for three hours, and then transferred to fresh benzyl alcohol until the specimen shows signs of becoming transparent. This appearance will be noted in the following section on clearing.

Clearing

Although alcohol is miscible with solvents of paraffin and other waxes, it is not miscible with the waxes themselves. Additionally the presence of alcohol in a specimen reduces its refractive index and can produce loss of microscopic detail. Thus it is now necessary to remove the alcohol from the specimen, and to substitute a reagent miscible with the wax to be used as a supporting agent. This process is known as *clearing* because it causes a rise in the refractive index of the specimen, and tends to make it appear transparent, a point which was commented upon in the preceding section as being produced by benzyl alcohol.

The most common clearing agent is xylol. This is miscible with alcohol and paraffin wax but not with water, hence it is essential that all the water must have been removed from the specimen by the use of absolute alcohol or benzyl alcohol. Any water which remains in the specimen will form an emulsion with the xylol and produce a white film within the specimen.

Various workers have suggested

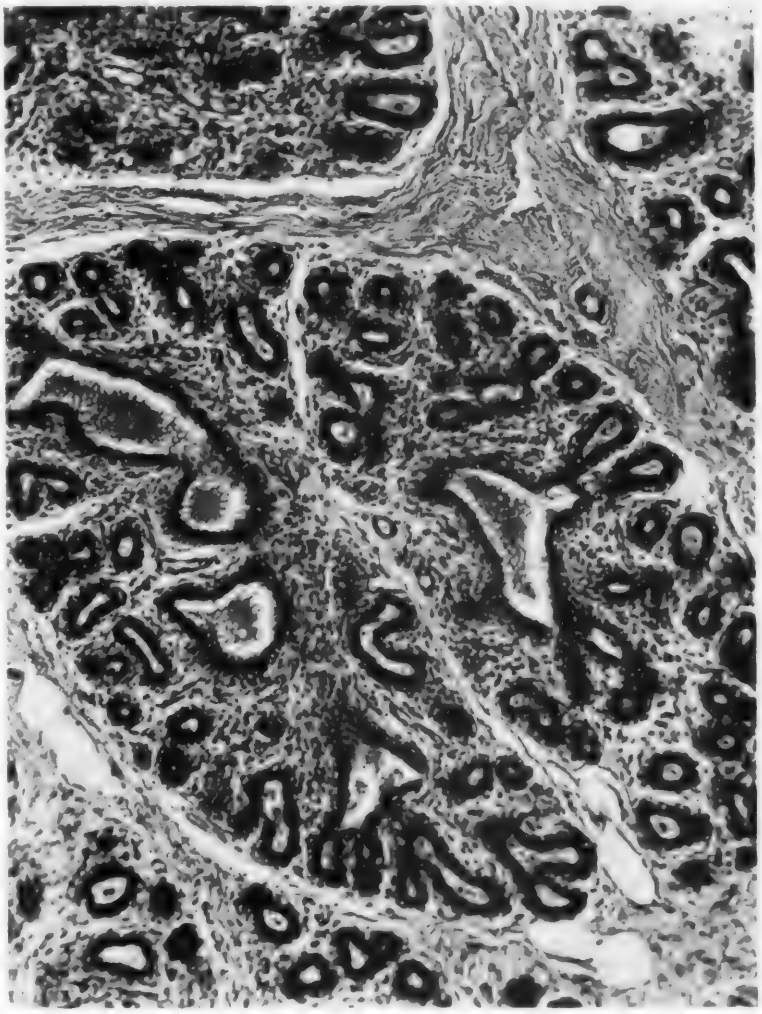
that 5% of phenol should be added to the xylol to prevent the possibility of water causing trouble, but the writer has found that the use of benzyl alcohol eliminates xylol. Benzyl alcohol is miscible with many of the waxes and if used in the final stages of dehydration the specimen may be directly transferred to the next stage which is the impregnation stage. Some workers who have used the writer's method of final dehydration in benzyl alcohol have suggested that a better result is obtained if the specimen is rinsed very quickly in xylol just before wax impregnation, but the writer has not found this to be essential.

Impregnation

The technique of wax impregnation is quite simple. It is obvious from the previous sections dealing with the stages of preparing a specimen that the reagents take time to penetrate into the specimen, and of course the same thing applies to the wax itself. To give the specimen maximum support the wax must be allowed to permeate into all parts of the specimen and to allow this to happen it is obvious that the specimen must be allowed to soak in liquid wax for a chosen period.

Again certain precautions are necessary in selecting the wax to be used. The melting point must not be too high otherwise the specimen may be cooked during the period of soaking. Generally the wax employed for impregnation should be paraffin or ester wax with a melting point of 48-55°C.

The technique is quite simple. 50 ml. beakers covered with small watch glasses are ideal as holders for liquid wax during the period of soaking or impregnating. The wax is melted into a layer of $\frac{1}{2}$-$\frac{3}{4}$ of an inch deep and held not more than 3 degrees above setting point either on a water bath or in an incubator. Special impregnating ovens are obtainable but are only necessary if a lot of this type of work is done. The specimen is transferred from the final clearing agent into molten wax and left for 3 hours. It is then removed to fresh molten wax for a further $1\frac{1}{2}$ hours, and then to a second change of fresh wax for a further hour. At the end of this period the specimen will be thoroughly impregnated with the wax and the final process of *imbedding* into a block of wax may be performed.



Section of mammary gland (cow) x 150

Imbedding

The imbedding of the impregnated specimen into a block of wax is done in order to make subsequent handling and attachment to the microtome much simpler. Any convenient container may be used to form the block, but the best method is as follows:

Obtain two pieces of 1-inch wide brass strip each about six inches long (actual thickness is not so important, but $\frac{1}{8}$ in. will make a stout finished job). Each strip is bent to an "L" shape. These two pieces may now be used to form a rectangular well, the dimensions of which may be varied by adjusting the "L"s. The base of the well is best formed by means of a piece of plate glass.

The process of imbedding may now be commenced. A layer of molten wax is poured into the container formed by the "L" pieces to a depth of about half an inch. This is allowed to cool until a skin starts to form on the surface. The impregnated specimen is then quickly transferred from the wax

impregnating bath to the centre of the wax layer. The container is then filled to the brim with more wax. The whole is allowed to cool until a definite skin has formed on the surface, and is then plunged quickly into cold water. This causes instant solidification of the wax and prevents the formation of crystals which would interfere with subsequent section cutting.

The "L" pieces may now be broken apart to free the block of wax within. The block may now be trimmed with a sharp scalpel. The object of trimming is to remove excessive wax from the block and to leave sufficient support for the specimen. The wax is pared away from two opposite sides of the specimen until a thickness of about 1 mm. is left around it, the two faces being so trimmed as to be parallel to each other. The other two faces of the block are then pared down to leave a thickness of $\frac{1}{2}$-1 mm. of wax. The length of the block is reduced until the specimen is almost exposed at one end, and the total length is about $\frac{3}{4}$ in. The block may now be attached to the microtome specimen carrier by gently warming the wax at the end which is farthest from the specimen and pressing this against the carrier face.

CUTTING TECHNIQUE

The block having been prepared and mounted on the specimen carrier, sectioning may now be commenced. The carrier is attached to the rocker arm of the microtome by the means provided (in the rocking microtome this is done by simply slipping the carrier on to a bayonet type of fitting). The set screws holding the microtome knife in place are tightened to hold firmly, and the specimen carrier is rotated so that the two parallel edges of the block become also parallel with the edge of the knife. The ratchet mechanism controlling the thickness of the cut is also adjusted to the desired figure.

The mechanism may now be operated and section cutting commenced. The setting of the block with regard to the edge of the microtome knife allows the block to meet the latter squarely, and the section, together with its supporting paraffin, are cut off in a thin shaving.

As was noted last month, each section pushes the preceding one off the knife, but the sections remain attached, eventually forming a ribbon.

The end of the ribbon may be advantageously supported with a scalpel held in the left hand while the microtome is operated with the right; this will reduce the chance of a ribbon breaking off short.

There are a number of faults which may occur in section cutting, and these may be due to the material itself or to the microtome. The most frequent of these are outlined below.

Possible faults

1. *The sections do not form a ribbon.*

Several things may be the cause:

(a) The sections may be too thick. Reduce thickness of cut.

(b) The wax may be too hard. Either work in a slightly warmer place, re-imbed the material in softer wax, or else dip the prepared block in a little softer wax so that it has a thin coat on the outside; this will allow sections to adhere to each other.

(c) The knife may be too cold. The remedy is a quick dip into warm water.

(d) The clearing agent may not have been completely removed before imbedding. The remedy is simply to repeat the impregnation process.

(e) The knife may be greasy. Clean with a little xylol and wipe completely dry.

2. *The sections form a ribbon, but the ribbon curves sideways.*

This indicates that the block has been unevenly trimmed, one end being thicker than the other. Retrim the block.

3. *The sections tend to curl up as they are cut.*

The wax is probably too hard. The remedy given above will usually cure this trouble.

4. *The sections crumble and disintegrate as they are cut.*

This may be caused by any of several reasons, the following being the most common.

(a) The wax used for impregnating and imbedding is too soft. Use harder wax.

(b) Sections being cut too thin, adjust ratchet thickness control.

5. *The sections tend to tear and the specimen may split.*

This may be due to one of the following:

(a) Blunt or chipped microtome knife.

(b) Insufficient fixation.

(c) The fixative reagent may not have been completely removed before dehydration and impregnation.

(d) Dehydration and clearing may have been badly performed.

In (a) the knife must be sharpened, but in the remaining cases the material will have to be discarded and fresh specimens obtained.

There are many other techniques for the cutting of sections on the automatic microtome, including impregnation of the specimen with other supporting agents such as gelatine, various resins, or by the freezing of the specimen before cutting by means of a special attachment to the microtome.

All these are, however, rather specialised methods, and as this article is intended to deal only with the very general principles and applications of section cutting, there is not room here to discuss the more restricted techniques.

FURTHER READING

S. H. Gage, "The Microscope," Comstock Pub. Co., Ithaca, New York, 1942.

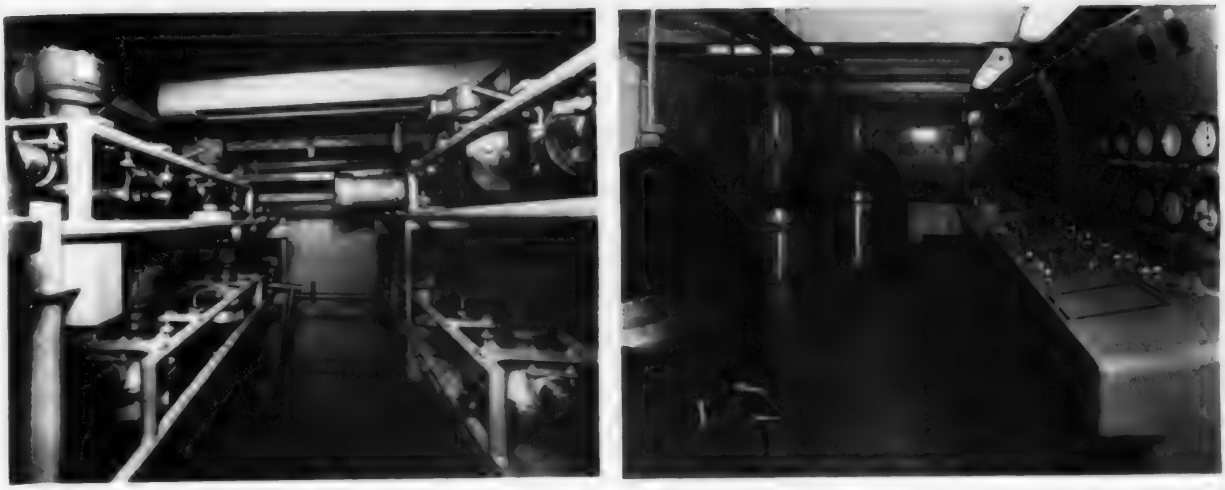
H. A. Peacock, "Elementary Microtechnique," Arnold and Co., London, 1947.

C. Lee, "The Microtomists Vade Mecum," Churchill and Co., London, 1937.

F. Cavers, "Practical Botany," University Tutorial Press, London, 1937.

REFERENCES TO PREVIOUS ARTICLES

S. M. Charlett, FOOD MANUFACTURE, 1956, **31**, 114 and 198.



Installation of Tylor's automatic batch control system at a Wall's ice cream factory. (*Left*): **Part of meter section showing model "SM" hygiene meters with electrical contacting heads.** (*Right*): **Control consoles and mixing vats.**

New Automatic Flowmeter for Liquid Control

RECENTLY introduced by Tylors of London, Ltd., is the Model "SM" flowmeter designed specifically for the food industry. It is manufactured in 1, 1½ and 2 in. sizes with flow rates from 25 to 3,000 g.p.h., available either for use as illustrated in Fig. 1 with 9 in. diameter easy-read batch type dial and totaliser, or with waterproof electrical contacting heads giving remote readings with full automatic control as shown in Fig. 2. Construction is in stainless steel with internal surfaces highly polished to eliminate the danger of harmful bacteria.

A quick-release clamp is fitted to facilitate easy dismantling for sterilisation; inlet and outlet are in line, with APV type "SP" in-place connections. A new type magnetic coupling is incorporated to avoid the possibility of gland leakage. In-place cleaning can be carried out at up to 140°F. with weak detergent solutions.

Fig. 1. Model "SM" hygiene meter with 9 in. easy-read dial.

Manual or panel control

A minimum of moving parts is submerged in the liquid, and accuracy claimed is 0·25% over specified flow range.

For manual control the meter is used in conjunction with the visual dial already mentioned. For remote control a unit is used comprising a model "SM" meter fitted with a transmitting type head, a distant reading panel with a presettable dial, a relay control box with push-button starter switch, a solenoid-actuated control valve and a power pack to provide 24 V. D.C. at 3 amps from standard 200/250 V. mains supply.

Distant reading panel mounting presetting dials to operate in conjunction with the relay control boxes are available in two sizes,

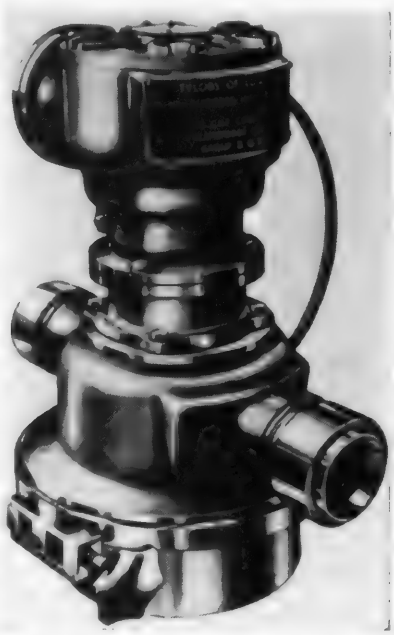


Fig. 2. Model "SM" meter with waterproof electrical contacting head.

7 and 11 in. diameter. Electrical connection between the presetting dial and relay box is made, via a single 8-core cable, by a multi-pin plug-in connector, the socket end of which is fitted into the dial housing. This simplifies replacement, since a new dial can be fitted in a matter of minutes.

All relays are of the latest plug-in type, making replacement a very simple and quick operation. The relay box is fully dust-proof and special shock absorbers are fitted to protect the relays from damage through plant vibration. Provision has been made for mounting the starter button and warning lights on the lid of the relay box when required, and this is very convenient where a control panel is not fitted.

A totaliser is incorporated in the dial mechanism to record the number of batches—not the total quantity of liquid delivered. When a total aggregate reading is required a separate panel mounting high-speed counter can be made available.

Ice cream installation

A number of alternative installations can be arranged to suit various requirements, including the provision of full interlocking to prevent the same liquids being dispensed more than once or in the wrong sequence during a mix.

This recently developed addition to the range of Tylor batch counters is primarily intended for use in applications where complete remote control of batching operations is required. It is designed to accept programme information from punched cards, tapes, rotary switches, uniselectors, relays, or any device with contact output. This feature enables it to be incorporated in process control systems concerned with automatic batching of different quantities, as for instance in mixing and blending processes. In view of the multiplicity of methods of feeding in this information, a standard control unit is not provided, but where required, control units suitable for remote or integral mounting can be supplied to meet particular applications.

An example is the automatic batch control system installed by T. Wall and Sons (Ice Cream), Ltd., in which Tylor's hygienic meters are predominant. This system ensures that precise quantities of liquids are delivered at the right time and in the correct increments. The accompanying illustrations show part of the meter section and consoles with mixing vats.

Briefly, the process is as follows: the console in the control room, with large easy-read dials, is pre-set to the required batching of the various constituents. The control unit is variable and repeatable. On commencement, the electric impulse from the console opens the pneumatically actuated control valve and the flow of liquid through the meters to the mixing vats begins. The meters are fitted with electrical contacting heads which send pulses back to the console dials until the batch is completed.

How Gaskells cure Bacon and Ham

(*Concluded from page 417*)

appealing aroma, better and easier crisping and improved flavour. The flavour of the bacon is so attractive that Gaskells feel they have an improved product.

The more dextrose that is added to the pumping brine, the more it shows up in the frying pan. However, because dextrose dissolves very readily, the amount used by Gaskells has been cut down progressively to its present figure of 56 lb. per 300 gallons of pumping brine. At this rate of use the company feels that it gets a satisfactory bacon with suitable economy in raw materials.

From the theoretical side, dextrose has a definite effect because of its reducing action. It certainly would help to give good colour, due to the improved rate of formation of nitroso-hæmoglobin, and would tend to hold down the aerobic putrefactive organisms.

Cerelose is being used by Gaskells in the pre-packed sliced bacon curing. In the special cure, it gives a product which is satisfactory in flavour and colour over three weeks in store. By experimenting, the company has been able to get a suitable cure without the addition of preserving chemicals, etc.—M. C. REECE, B.Sc., Ph.D. (*Brown and Polson, Ltd.*).

Corrosion of Tinplate Cans

(*Concluded from page 420*)

plate surface. In such event, subsequent corrosion of the can by its contents follows the same pattern as in a lacquered can. Hydrogen-swell formation and perforation frequently result. It is possible, however, that other kinds of protective films may exist which cause intensification of the attack on exposed steel. Even a highly protective oxide film is not an unlikely cause of such a phenomenon.

Since the corroding potentials of tin and iron are not very different and depend upon *p*H, it follows that, if a comparatively small difference in *p*H exists within a can, corrosion may follow without involving both metals and certainly without the whole area of either metal assuming a uniform cathodic or anodic function.

REFERENCES

1. D. Dickinson, *Corrosion Technology*, Jan./Feb., 1955, **2**, 4-7, 48-51.
2. H. Cheftel, J. Monvoisin and M. Swirski, *J. Sci. Food Agric.*, 1955, **6**, 652-655.
3. D. Dickinson, *ibid.*, 1957, **8**, 721-726.

WRITING A BOOK?

The publishers of *Food Manufacture* invite the submission of manuscripts of books to be considered for publication. All manuscripts will be promptly acknowledged and carefully considered by qualified experts. A synopsis with chapter headings should be sent in the first instance to

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Fluorescent Inks

can enhance display at only 2-4% cost increase

says P. Lister*

THE use of fluorescent colours can now be considered as practical for all printing processes. The disappointing results obtained a few years ago, when the first experiments were made with letterpress inks need never recur, mainly due to the great improvements made in the fluorescent pigments now available, but also due to the better understanding of the particular problems involved, especially that of design.

It is probable that the greatest demand for fluorescent inks will develop for packaging. The growth of the supermarket, and the consequent premium on effective and eye-catching design, offers a natural outlet for this new range of colours, and provided their special characteristics are fully understood by both designer and printer, there should be no problems in their use. The development work done in England during the last three years has proved without doubt that their large scale use need no longer be confined to the screen process, and it can only be a question of time before the new British package designs incorporating fluorescent colours make their impact felt upon the general trend of international design.

Fluorescent materials available for printing inks

So far, only one pigment dyestuff has been produced with a marked degree of fluorescence, and with colour strength and physical properties comparable with normal printing ink pigments. This is a green-shade yellow, and from it fluorescent yellows and light greens can be produced.

The majority of the pigments at present used are derived from a range of fluorescent dyestuffs of which rhodamine and brilliant sulpho flavine are typical. These dyes are used to colour resin solutions, which may be of several types, such as sulphonamide or acrylic, and after they have been dyed they are cured to a solid, and then pulverised to varying extents. The larger particle sizes give the brightest shades, but inks made from them do not have good working properties, and so are most suitable for screen process inks, whereas small particle sizes enable offset and letterpress inks of satisfactory working properties to be made, but at the expense of some brightness. By comparison with other pigments, these materials have poor colour strength, and are also very transparent, with the result that best results can only be obtained with relatively thick films, as in the screen process, or with an underprint colour which reinforces the colour strength of the dyed resin particles.

The lightfastness of these materials has been greatly improved since they were introduced, and is now good enough for use in posters or packaging materials whose life is likely to be several months; they are, however, not yet equal to the most lightfast non-fluorescent pigments, and also tend to be less stable to heat, as in tropical exposure or stoving. The colour range available is green, yellow, orange, red and magenta, and at present there appears to be no likelihood of a blue being added to the range. The different resins used vary in their resistance to solvents, and also in the extent to which they give lightfastness and heat resistance to the various dye combinations necessary to produce different shades. It follows that an ink manufacturer needs to formulate from a variety of particle sizes and resin bases in order to get optimum results for any particular application requirement.

There are at least six manufacturers of these pigments in Europe and the U.S.A., and the quality of materials, judged in terms of brightness, colour, strength, working properties and resistance properties, continues to improve steadily.

History of fluorescent printing ink development

The first pigments in general use were developed by the Switzer brothers in the U.S.A., who took out patents in 1947, sub-licensing the use of these pigments in the U.K. shortly afterwards.

The first types available were only completely satisfactory for screen process work, for which they soon became generally accepted; although inks for the other printing processes were offered soon afterwards, they did not come into general use until the late 1950s. There were many teething troubles associated with their development, and costs were significantly higher than those of non-fluorescent materials, but the development of supermarkets in particular gave a considerable incentive to their use in brighter colours for packaging inks.

Coates, anticipating the importance of these materials if they could be made more generally useful, started an extensive development programme in 1958, the initial target being improved offset and gravure inks for packaging, and similar work was put in hand in the U.S.A.

At the end of 1960 the use of fluorescent colours was almost entirely confined to paper and board, but during 1960 and early 1961 Coates extended their development programme to cover all

* Coates Brothers Inks, Ltd.

types of packaging inks, and this work, together with the availability of improved pigments, enabled Coates to initiate full-scale production trials of many new types of fluorescent ink during 1961. These trials established the practicability of applying these colours to all the important printing surfaces by any of the major printing processes.

Specimens produced in these trials are the main feature of Coates' stand at the 1961 Packaging Exhibition, at which specimens of fluorescent inks are being shown on cellophane and polythene bags, multiwall sacks, foil wrappers, plastic tubes and bottles and tinplate and aluminium containers, as well as board. No equivalent range of materials is at present available in any other country, and the work involved in the trials aroused a great deal of interest, particularly from the U.S.A. and Scandinavia as well as the U.K. It seems certain that this demonstration of the versatility of these inks will lead to a wide extension of their use, and to the general acceptance by designers of packaging and display materials that a new range of particularly brilliant colours is available for general application.

Printing characteristics

The extreme transparency and brilliance of these colours, together with their relatively weak colour strength, calls for careful working if best results are to be obtained. Colours are particularly sensitive to press cleanliness and to whiteness of stock. They should not normally be blended with other inks, because their characteristic brightness is impaired by very small additions of conventional inks. Shade variation is more likely than with non-fluorescent inks, because the ink maker is seldom able to correct any variations in pigment by blending during manufacture. The resistance properties required should be specified in detail, because inks of maximum resistance properties are considerably more expensive, and in certain cases improved colour strength can be obtained if, for example, maximum light and product resistance are not required.

It is seldom possible to obtain exact facsimile, using different printing processes, even with conventional inks, and the differences between the processes are accentuated when fluorescent colours are used. It is not at present possible to match the brightness obtained from the very thick films laid down by the screen process; the difference will increase as film thickness is reduced, and if near-facsimile is required with several different processes, it is recommended that proofing be done offset, because the standard obtained in this way can always be equalled or improved upon.

Gravure is particularly suitable for fluorescent printing, because of the relatively heavy film and the good working properties which can be obtained from fluorescent pigments in solvent inks.

Offset. Because of the thin film carried, and the weakness of the colours, only yellows and greens can at present be printed satisfactorily with one working on white paper or board. All other colours require two workings to give satisfactory colour strength, and the best results are obtained with two impressions on an underprint of a suitable non-fluorescent ink. Wet-on-wet printing is satisfactory. Special attention must be paid to the use of minimum quantities of the recommended reducers only. Machine setting must be designed to carry the maximum film consistent with clean working.

Letterpress. No special problems are involved. Again, because the colours are relatively weak, an underprint colour gives improved results at normal film weights on smooth-surfaced paper. Two-colour wet-on-wet printing is quite satisfactory. Good colour strength can be obtained on white paper or board with one working if a rough surfaced paper is used and a full film is carried. Moisture-set inks on board work well.

Gravure. With the exception of yellows and greens, where normal working is satisfactory, best results are obtained by the use of a coarse screen, e.g. 90 to 100 line, and a deep etch, e.g. 0·020 to 0·024 in. To avoid drying difficulties with the heavy wet film thickness, special solvents are often used in the inks and recommended as reducers. Normal reducers may be incompatible, or cause ink thickening. On foil, an underprint white or opaque colour is necessary, whilst on film it gives markedly improved strength and brilliance.

Costs and the effect of performance specifications on costs

Compared with many colours used in conventional printing inks, the problems of formulating fluorescent colours increase very greatly when particular performance requirements such as resistance to light, heat, chemicals or abrasion resistance is required. The variations in cost of inks with different resistance properties are consequently very great, and it is particularly important that the end-use requirement be specified accurately if the cheapest suitable inks are supplied. In general, there are three main performance classifications calling for inks of different qualities and costs: (a) packaging quality; (b) display quality; (c) wrapping quality.

Packaging quality inks are formulated to give maximum performance in terms of light resistance, product resistance, production speed and abrasion resistance. Display quality inks are of similar lightfastness, but do not have the other special properties required for packages. Wrapping quality inks have reduced lightfastness, and should be used only when prolonged exposure to light is not required; particularly when the flexographic process is used, wrapping quality inks show a marked cost reduction for any particular colour strength when compared with display or packaging quality.

(Continued on page 437)

Correspondence

The Dangers of Silicones

SIR,

Mention in FOOD MANUFACTURE (August, 1961, p. 348) of the use of silicone treatment of certain foods to promote free-flowing properties prompts us to draw attention to the possible dangers of such a procedure.

Silicone coating of bread tins and the use of silicone coated papers in the baking of certain cakes are well known and have been used successfully. The possible effects of traces of silicone products introduced into cake batters have also been investigated and warnings issued.[1, 2, 3] The following observations demonstrate that in certain recipes traces of silicones can have startling effects.

Our first observation of the effect occurred quite by accident. The baker sifted and mixed the flour and baking powder on a sheet of silicone-coated paper and after baking found that the resultant sponge was very coarse in texture and had collapsed. Later, variations in the quality of sponges produced from production runs of cake flour were eventually traced to contamination of the flour from silicone-coated dust collector sleeves in use in the mill; a small quantity of flour collected in the sleeves was being returned into the production line.

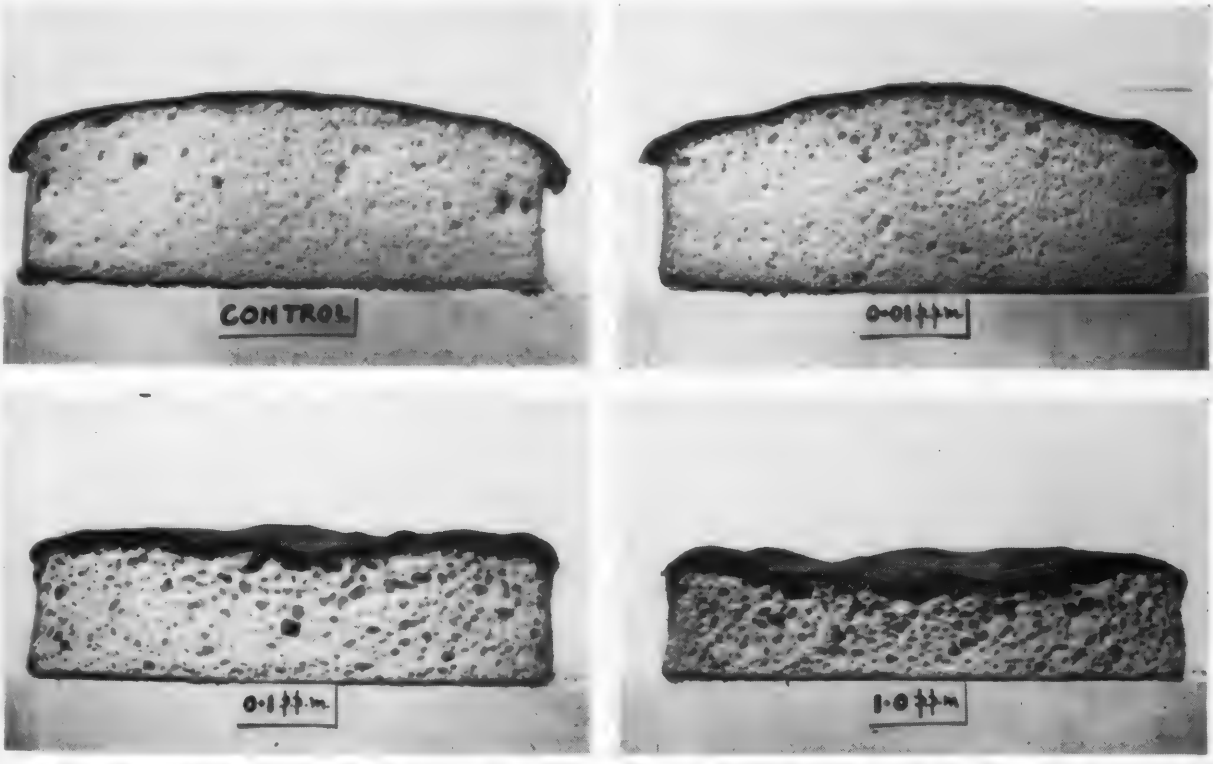
Some of the textile sleeve material was extracted with an organic solvent, and after evaporating the solvent the residue was added to cake flour in varying trace amounts. The attached photographs demonstrate the effects. As little as 1 part in 100 million on the weight of flour coarsened the texture and 1 part per million caused complete collapse in the sponge.

The experiments were repeated with samples of a commercial silicone preparation (an antifoam fluid) and similar effects were observed.

A sponge recipe (flour, sugar and egg) is most sensitive to such contamination. The sensitivity of other typical cake recipes and baked goods is less, as is shown by the comparative tests shown in the table overleaf.

Wide variations were observed in the behaviour of different silicone preparations, the effect being less pronounced as the degree of polymerisation and the viscosity of the silicone fluid increased. The effects described were obtained with the most active preparation examined.

In general the dangers from



These four pictures show the effect of the addition of silicone from treated sleeves in plain sponge cakes. The parts per million quoted are on flour weight.

Sponge (flour, sugar, egg)	effect seriously noted	0·1	p.p.m. on flour weight
High Ratio Yellow Cake (flour, sugar, egg, milk, fat)	effect seriously noted	50	p.p.m. on flour weight
Bread	effect on volume and texture noted	100	p.p.m. on flour weight

external contact with silicone coatings in baking are very slight, but our observations confirm that the *entry* of slight traces of silicone products in the preparation of baked products can have startling and disadvantageous effects.

The proportions mentioned in your recent issue are far larger than those which gave rise to our observations and we view with alarm the possible treatment of a foodstuff—sugar—used so widely.

JOHN WILLIAMS,
Chief Chemist,
Spillers, Ltd., Central Laboratory,
Station Road, Cambridge.

REFERENCES

1. P. E. Ramstad, "Silicones may affect cake quality," *Cereal Science Today*, 1958, **3**, 64.
2. W. J. Stadelman and G. Bennett, "The effect of Several Silicones on Volume of Yellow Cakes," *Food Technology*, 1960, **14**, 119.
3. B.B.I.R.A. Bulletin No. 70, August, 1959 (circulation to members only).

Scientists' Who's Who

EIGHT years ago Leonard Hill, Ltd., published "Who's Who in British Science," the first directory of its kind. The names of over 3,000 leading scientists, with their personal and professional particulars, appeared in this unique book. It is now sold out and the publishers are regularly asked when the next edition will appear.

The answer is that it is unlikely to appear again as a purely private venture because it is too costly to produce at the price people are prepared to pay for it.

A directory of this kind is disproportionately expensive to produce because of the enormous amount of detailed labour it requires. Questionnaires have to be sent to thousands of scientists and it may be months or even a year before they are returned. The questionnaires have to be edited, and then a proof of each entry has to be submitted to the person concerned. Corrections are usually prolific, because personal details such as address, appointment, scientific honours, etc., can change considerably in a period of months. Not until every proof is returned and every correction made can the directory appear.

"Who's Who in British Science" is a directory that is genuinely needed. It is of immense value to our scientists, universities, industries, educational authorities, ministries, and the press, and it is consulted regularly in under-developed countries seeking scientific and technical assistance. In this respect it helps to ensure that British scientists and British industry are not overlooked. There are repeated demands for a new edition, but it is simply not commercially feasible for a private publisher to undertake.

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Fluorescent Inks

(*Concluded from page* 434)

The additional cost of using fluorescent inks will obviously depend primarily on the ink cost in proportion to the cost of the job as a whole, and the proportion of the colour in the design which is being changed to a fluorescent colour. A fluorescent ink of packaging or display quality is likely to cost between 50% and 100% more than a conventional ink; if the ink cost is 10% of the total cost of a job, it follows that the maximum possible increase in cost would be between 5% and 10%, and if, as is more likely, only 20% to 33% of the colour is replaced by fluorescent colour, the cost increase will be between 1% and 2%. This assumes that ink usage and productivity remains unaffected; if an additional working is required, as in offset printing of some colours, extra costs are incurred, as they also are if exceptionally heavy films are carried in order to obtain good colour strength.

Even accepting these additional costs, however, it is unlikely that the cost of using fluorescent colours in a design will increase costs by more than 2% to 4%. Examples can be misleading because of the very different costs involved in different jobs, but it is interesting to note that the cost of introducing one fluorescent colour into a three-colour design for a carton of about $7 \times 5 \times 1$ in. was between 5s. and 10s. per 1,000 cartons, gravure or offset.

Contributions and Correspondence

The Editor welcomes practical contributions on all aspects of food manufacture, including the production and testing of raw materials. Articles should be illustrated with photographs and diagrams, as far as possible.

Letters on any subjects covered by *Food Manufacture* are also invited.

ADVANCES in FOOD TECHNOLOGY

ANALYSIS

Determination of moisture in dried fruit

The aim of this work was to elaborate a speedy and accurate method of determining water in dried fruit. As a result of investigation, the method was based on extraction of water from a finely crumbled sample with methanol, and titration with an iodine titrient according to the reaction given by K. Fiszer. Comparison of the results of extraction-titration and the drier-method showed only slight differences, but the former method has one great advantage, that of reducing the time spent on determination. Accuracy of results depends on perfect pulverisation of the sample, perfect dehydration of pyridine and methanol, precise standardisation of the reagent in calibrated gauges, effecting the titration in airtight vessels—e.g. an automatic burette, connected by glass or rubber stopper with a flask filled with the titrient.—Zagrodzki and Niedzielski, *Przemysl Spożwczy*, 1960, **2**, 25.

MEAT

Continuous-flow meat cutting system

The equipment of a continuous-flow meat quartering and dividing installation is described. Roller tables, circular and band saws, and efficiently sited belt conveyors eliminate superfluous operations, increase output and simplify transportation. Electric saws are used for cutting backbones and pipe conveyors for transporting large cuts. The conveyor band is automatically washed with warm water and purged by rubber collectors, so that the meat is conveyed on a clean and almost dry band.—Zdzieszynski, Gospodarka Mięsna, 1960, **2**, 6.

FLAVOUR

Flavour volatiles from methionine

A qualitative investigation of the volatile compounds formed during the Strecker degradation of DL-methionine has been carried out. The volatile products were condensed in cold traps and analysed by gas-liquid chromatography. The condensate was shown to consist chiefly of methyl mercaptan, together with traces of other compounds including acrolein and dimethyl sulphide. The suggestion that degradation of methionine first gives rise to methional is supported by the identification of this compound and the demonstration of its decomposition with ninhydrin to methyl mercaptan and acrolein. These findings are discussed in relation to the importance of methionine as a source of flavour in food.—Ballance, *J. Sci. Food Agric.*, 1961, **12**, 532.

NUTRITION

Protein value of seaweed

Samples of two seaweeds, *Chondrus crispus* and *Laminaria digitata*, were dried and extracted to increase their concentration of nitrogen. These preparations were fed to young rats as sole sources of nitrogen at levels representing 7-10% crude protein in the diets.

The digestibility of the nitrogenous constituents were low in both cases. The metabolic utilisation of absorbed nitrogen was good in the case of *C. crispus*, and poor in the case of *L. digitata*. The nitrogenous constituents of the preparations were defective for the support of adequate growth.—Larsen and Hawkins, *J. Sci. Food Agric.*, 1961, **12**, 523.

PACKAGING

Fresh fruits and vegetable prepacking

Transparent plastic wrappings not only increase the sales appeal of goods but also improve their preservation, provided that suitable precautions are taken and the work is entrusted to expert personnel. Such wrappings are able to protect fruits and vegetables against loss of weight and turgescence. They can also be used as "physiological wrappings" where the ripening of the fruits is artificially delayed in a kind of "gas storage," but a good deal of further fundamental research is still required before this method can be used on an industrial scale.—Marcellin, *Industries Alimentaires*, 1961, **78**, 421.

SUGAR BEET

Ultrasonics to promote growth

A new method to improve sugar beet production consists in transplanting seedlings previously developed in hot beds into irrigated, or even non-irrigated, fields so that two crops can be harvested from one field in one year, and the sugar factories can commence work early in August. In this way, the yield can be greatly increased, or the area needed for sugar beet growing correspondingly reduced. It is also possible to increase the yield by the application of ultrasonic methods.—Obolensky and Tartchinsky, *Industries Alimentaires*, 1961, **78**, 399.

Lipid Extraction

Considerable interest was expressed by industry scientists in a newly developed methanol-chloroform-water lipid extraction method which was outlined in a paper, "Some Differences in Fatty Acid Composition Between Intramuscular and Depot Fat in Meat Animals," by A. Joyce Ostrander and L. R. Dugan, presented to a recent meeting of the American Meat Institute Foundation.

As Mrs. Ostrander reported, the Foundation's study of lipid extraction and solvent systems indicated that no other existing method was regarded as completely satisfactory. In consequence, a modification of a method by Bligh and Dyer was developed by Mrs. Ostrander and Dr. Dugan. The new method has demonstrated reproducibility of results, speed (15 min. per extraction), suitability for alkaline isomerisation, high yield, suitability for raw, cooked or lyophilised meat, and ease in handling.

Details of the MeOH-CH_3Cl-H_2O lipid extraction method now have been made available in AMIF Bulletin No. 50, *A Rapid, Quantitative Lipid Extraction Method*. Copies (AMIF publication F-434) will be sent to anyone interested, however, on request to H. A. Armstrong, American Meat Institute Foundation, 939, East 57th Street, Chicago 37, Ill., U.S.A.

MACHINERY and EQUIPMENT

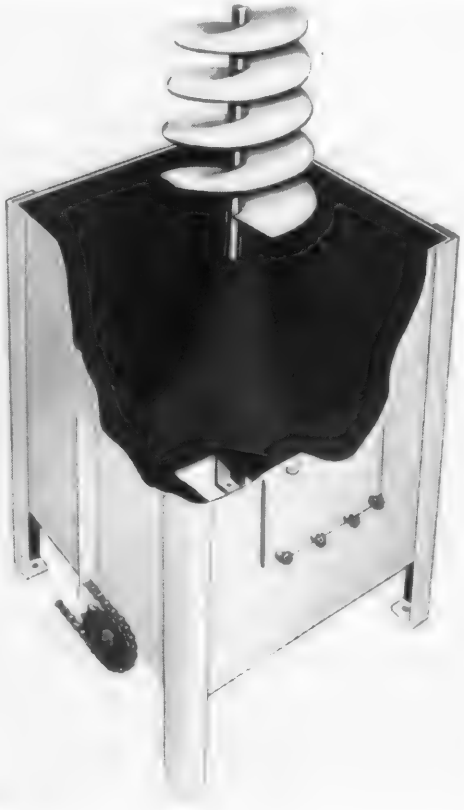
HOMOGENISER

The *Dispersonic* homogenising and dispersing unit has been specially designed for the high speed dispersion of powders in liquids. With it, emulsions containing solids which would rapidly wear out conventional equipment are claimed to be efficiently produced. Rough mixes of powders in liquids or emulsions are passed in a thin stream at high velocity across a blade which is made to vibrate at its natural frequency of 18-22 kc./s. Cavitation is induced and extremely high pressures applied within the liquid stream, without the loss of energy which normally occurs in transfer from one medium to another. Mounted on a steel baseplate it takes up only 5 sq. ft. of floor space. For details quote **FM. 1.**

This "Dispersonic" ultrasonic homogeniser has a throughput of 300 g.p.h. on 3 h.p.

BATCH MIXER

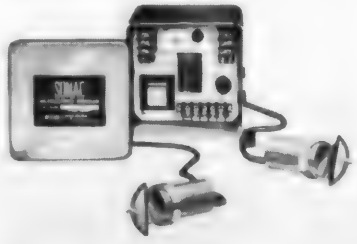
The fundamental principles of dry material batch mixing are employed successfully for the first time in a new ultra-rapid square mixer, which is now in full production. The material being mixed is discharged from the worm along its entire length of vertical travel and is thrown against an angular shaped housing. The effect of this action is to create a turbulating movement, with the result that the whole of the machine's capacity is used as a mixing area. Tests on foods, etc., have shown that the machine produced a homogeneous mix in approximately one quarter of the standard mixing time. For details quote **FM. 2.**



Exploded view of a new dry material batch mixer, which has a system of templates in the base turning the square design into a cone-shaped container which assists the discharge of material.

SENSING AND SWITCHING SYSTEM

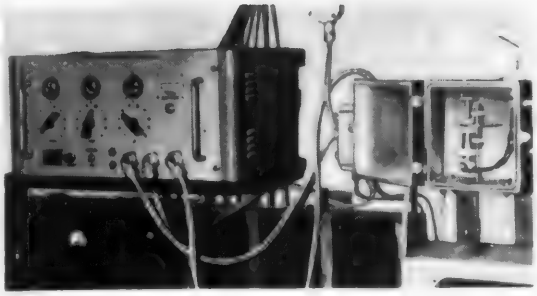
A sensing and switching system using an ultrasonic sound beam is available, and is expected to have wide application in industry for automatic counting, package routing, level control, positioning, sorting and numerous other control operations. It consists of three major parts: a control unit that contains a transistorised amplifier, a plug-in output relay and a power supply; and two hermetically sealed acoustic sensors. The two matched sensors convert electrical energy to ultrasonic energy and vice-versa. One sensor acts as a transmitter; the other as a receiver. For details quote **FM. 3.**



This ultrasonic sensing and switching system has a variety of uses in automatic counting, package routing, level control, etc.

NEW BUTCHERING MACHINE

A piece of equipment designed to cut up over 300 heavy pigs an hour has been installed in Wall's meat products factory in London, and is believed to be the only one of its kind in the country. The unit consists of a 5 ft. wide stainless steel conveyor, 30 ft. long. Mounted above the conveyor are two large rotating circular knives which cut parallel to the length of the conveyors. Split hog carcases on gambrels are elevated by an overhead drop finger conveyor, fitted with variable speed, and are cut down by automatic machinery which allows them to fall at right angles to the direction of travel. The first rotating knife separates the leg whilst the second cuts off the shoulder. The shoulder, middle and leg are then carried on transfer conveyors to the boners. Advantages of the new machinery are accuracy of cutting, minimum of physical effort required, speed of operation and high degree of control. Details on application, quoting **FM. 4.**



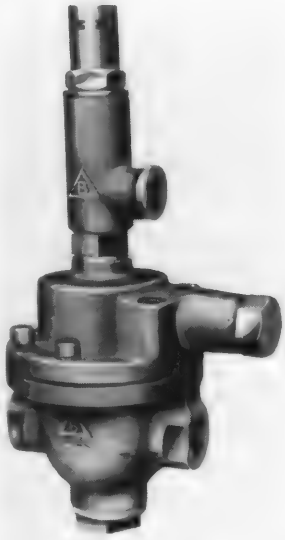
An electronic batch counter counting bushels of malt at the brewery of Whitbread and Co., Ltd.

ELECTRONIC COUNTING

Elimination of human error in dial watching is an advantage of an electronic batch counter installed in a London brewery. The main shaft of the elevator, which feeds malt to the malt hopper, in turn operates a smaller shaft, which revolves a segmented disc situated in the photocell and light head assembly of the electronic batch counter. As this shaft revolves and each bushel of malt is delivered to the hopper, so the light beam is broken by the segmented disc, and causes the count to be registered in the main control unit. On completion of a count, which is pre-set according to the particular mix required, the elevator and main malt feed are automatically stopped. For details quote **FM. 8.**

PRESSURE PROTECTION VALVE

An improved excess pressure protection valve for steam lines, which has a number of unique features, has recently been introduced. One of the most important single characteristics is that the steam supply is not shut off completely in an emergency, the downstream reduced pressure always being maintained at the set level so that process work, etc., is not interrupted. The device includes a double-beat valve attached to a piston across which a pressure differential will be produced by any marked increase in inlet pressure. The effect of the differential is to lift the piston which brings the main valve closer to its seating faces, so that the downstream line is automatically protected from excess pressure. As soon as the supply pressure returns to normal, the valve automatically resumes its original position. Details on application, quoting **FM. 5.**



An improved pressure protection valve for steam lines.

FLEXIBLE ALUMINIUM TUBING

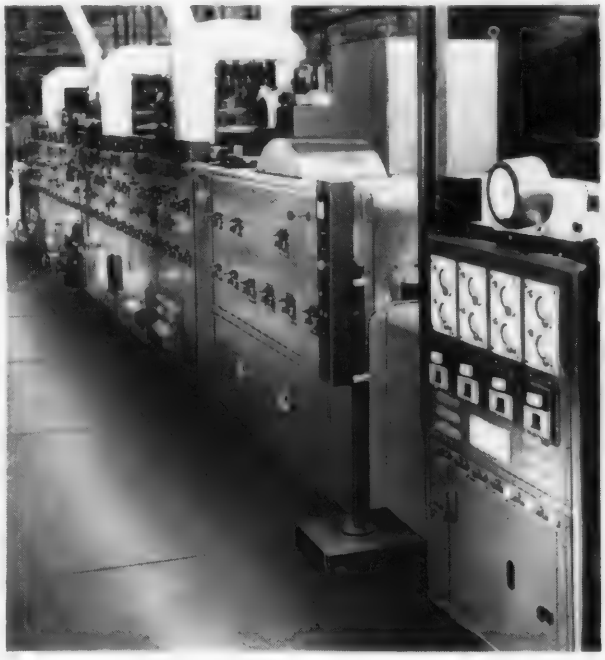
Hitherto, production of flexible tubing has been confined to galvanised steel, stainless steel and bronze. Many industries, however, face problems of handling particles, gases or fluids through flexible tubing where the special advantage of aluminium prove of particular value. For this product, aluminium strip is rolled and slit to fine tolerances and then is helically formed, by means of its interlocking edges, into tubing. A continuous sealing cord is introduced between the interlocking edges to maintain pressure tightness with flexibility. The choice of a high strength alloy, *Noral 54S*, offers a tube suitable for pressure service at about one third the weight of similar tubing in other metals. This is proving of special interest in road-tanker and other bulk handling applications where hoses must often be man-handled. For details quote **FM. 9.**

MOISTURE MEASURING UNIT

A moisture measuring unit for use with automatic electronic instruments, known as the *Moist-O-Graph*, permits moisture content percentages previously considered unmeasurable to be both measured and controlled; it is claimed that moisture contents above 40% can be controlled in paper applications. This unit makes possible accurate automatic control of moisture in tobacco and food products, including barley, oats, linseed, flour, rice, and dried food products. Details on application, quoting **FM. 6.**

HIGH FREQUENCY OVEN

The introduction by Baker Perkins, Ltd., of a biscuit oven incorporating high frequency dielectric heating, as well as conventional convected and radiated heat, is a further advance in the manufacturers' problem of how to produce more biscuits from the same or less space without prejudicing the quality of the product. Certain existing ovens of the Baker Perkins range are suitable for the incorporation of high frequency units into the baking chamber. This will give an appreciable increase in output, but not as much as would a specifically designed unit—**FM. 7.**



Baker Perkins high frequency biscuit oven, which incorporates dielectric as well as conventional heating.

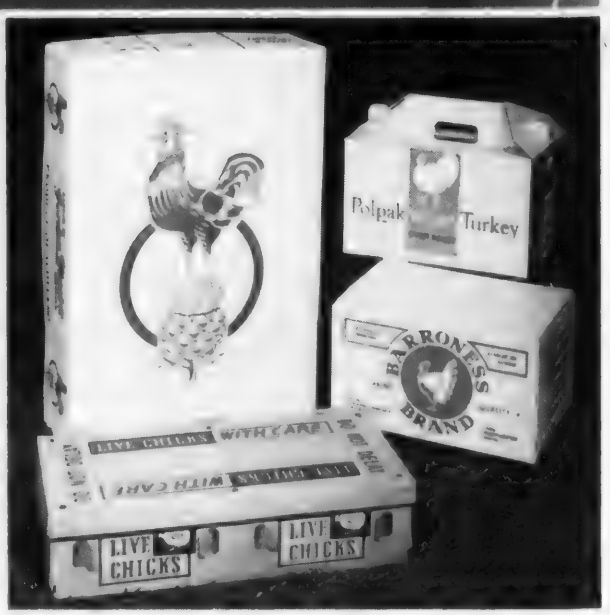
This polythene bag pack enables small chicken portions for one person to be a commercial proposition.

Packaging Pictorial

a survey of recent packs

A new bottle shape and a redesigned label has been produced for Beecham's "Ribena" blackcurrant beverage to cater for changed marketing conditions. Most sales are now made through grocers' shops and supermarkets instead of pharmacies as formerly.

(Above): *These cartons and sales aids for Lyons's "Frood" products are supplied by Metal Box. The Fish Finger and Fish Cake packs are dry waxed inside and out.*



(Right): *A selection from the range of fibreboard poultry packs made by Reed Corrugated Cases, Ltd.*

(Right): *Made of polystyrene, these non-returnable plastic cream bottles are the first to be marketed in this country and appeared in June.*

(Left): *Sarsons have introduced a new pourer design in their polystyrene vinegar bottle; the two-toned bottle in maroon, with a clear base which shows when the contents are low, has a white polythene push-on top and a white polythene drip pourer in the neck.*

This 6 in. diameter dish was recently added to the range of aluminium foil containers made by the Metal Box Co. The new container is not lacquered and has a fully curled flange. Further sizes, both round and oblong, will be added from time to time.

(Left): *One dozen cartons parcelled together in a sheet of "Cellophane" form a handy compact pack providing moisture and dust protection and enhancing appearance. The film is heat-sealed MSAT 300 supplied by British Cellophane, Ltd.*
(Right): *The foil for this new Kraft cheese pack is made by Venesta Foils, Ltd.*

NEWS DIGEST

Printing Inks for Food Packaging: Committee's Work

The printing ink and food manufacturing industries have for some time past had under review the possibility of health hazards arising from the use of printed matter in direct contact with foodstuffs.

In October, 1958, the Society of British Printing Ink Manufacturers issued a pamphlet on the subject, in which the laws and various regulations applying in the U.K. were summarised and the society's opinions and recommendations to its members were clearly stated. There is no known case in which the accidental ingestion of printing ink has been injurious to health, but in brief, the society's attitude is that printing inks are not intended to be food "additives" and should not be allowed to come into direct contact with foods; that inks known to be for use on immediate food wrappers, *i.e.*, wrapping materials with which the food is in direct contact, should not be formulated from any materials known to be hazardous and that the printed surface should always be on the outside of such wrappers.

Early in 1960 the printing ink and food manufacturing industries took the initiative and formed a Joint Committee to which representatives were appointed from the society, the Cake and Biscuit Alliance, the Cocoa, Chocolate and Confectionery Alliance, the Food Manufacturers' Federation and the British Food Manufacturing Industries Research Association. This committee's task was to examine the position and to see what might be done on a voluntary and co-operative basis to assist both ink makers and their food packaging customers. Several meetings have been held during the past year and as a result of these discussions, a greater degree of understanding of each other problems has been achieved and agreement has been reached with regard to certain printing ink materials which it is recommended should be excluded from formulations designed for printing immediate food wrappers.

The food trade organisations concerned are individually advising their respective members on the subject and, in doing so, will emphasise that the food manufacturer must make it perfectly clear to his supplier when an order is for packaging materials which will come into direct contact with food products. Providing this is done, ink makers will be in a position to give direct written notification to their customers, on request, regarding the suggested range of uses for an ink, thus supplementing the advice and guidance given in the society's pamphlet, "Printing Inks for Use on Food Wrappers and Packages."

The Joint Committee of representatives of the society and of the food trade organisations is to remain in being. It will meet as required to consider any further materials which it is felt should possibly be excluded from formulations designed for printing immediate food wrappers, and to this end the society may seek the co-operation of the suppliers of such materials.

Canned meat and meat products

Total production of canned meat and canned meat products in the period April to June, 1961, was 12,000 tons, compared with 11,400 tons for the same period in 1960, according to M.A.F.F.

Canned fruit and veg. up, but canned soup down

Figures recently issued by the M.A.F.F. show that for the period January to June, 1961, total production of canned fruit in U.K. was 42,500 tons, compared with 33,100 tons for the same period in 1960. For bottled fruit the corresponding figures were 1,000 tons and 600 tons, and for canned soups 91,600 tons and 107,400 tons.

Commercial Plastics Group—new company

A new subsidiary company—Plastic Containers, Ltd.—has been formed by the Commercial Plastics Group to promote the Group's container and finished pack products. The company will offer complete design, advisory and production facilities for plastic packaging, based on the products of the parent group.

Address of the new company is Berkeley Square House, Berkeley Square, London, W.1 (tel.: Mayfair 8030).

Processed milk production

For the period April to June, 1961, the M.A.F.F. have issued the following figures for processed milk production (1960 figures are shown in brackets): bulk condensed milk, 12,700 tons (13,100); canned condensed milk, 61,500 tons (63,400); milk powder, 38,100 tons (36,300).

Mr. Christopher Soames, Minister of Agriculture, Fisheries and Food, and his son, Nicholas, watch fish being filleted at the Grimsby factory of Birds Eye Frozen Foods, Ltd. On the extreme right is the supplies director, Mr. C. F. Sedcole. The minister spent nearly two hours at the factory on August 10 as part of a two-day tour of the Humberside fishing industry, his first since taking office.

"Paltry" support for Baking R.A.

In the report for D.S.I.R. by the Official Visitors to the British Baking Industries Research Association, Dr. A. H. Cook and Dr. T. F. Macrae, it is stated that the financial support the industry is now giving to its Research Association compares very unfavourably with what some other industries, based on old crafts, are providing for their Research Associations. The grant-earning income of the B.B.I.R.A. subscribed by the industry, is only 0·009% of the gross output of the industry. The following are the corresponding figures for some other Research Associations:

	%
British Boot, Shoe and Allied Trades Research Association	0·02
Hosiery and Allied Trades Research Association ...	0·02
Fruit and Vegetable Canning and Quick Freezing Research Association	0·02
British Leather Manufacturers Research Association ...	0·04
Lace Research Association ...	0·09
File Research Council ...	0·3
Research Council of the British Whiting Federation	1·1

The total amount of money subscribed by the bakers to their Research Association at present is only about £40,000 per annum which is paltry compared with the large sums of money spent by the industry on advertising, of which television alone accounts for about £2 million per annum.

The report adds that the director and his staff at Chorleywood have good reason to be satisfied with the results of their efforts to date, for in spite of a restricted budget they have provided a good service to the subscribers in dealing with their day-to-day problems and, in addition, have a variety of well-conceived research projects in progress which, when completed, should be helpful to the industry. With the completion of the new laboratories providing improved facilities for work on biscuits, the Research Association is now better equipped to cope with the problems it encounters.

Benjamin Electric—new Scottish office

New Scottish offices of the Benjamin Electric, Ltd., were opened on September 5 at 259, St. Vincent Street, Glasgow, C.2.

Soft drink production

The M.A.F.F. say that production figures for soft drinks for the period April to June, 1961, were as follows: concentrated, 12,014,000 galls.; unconcentrated, 65,495,000 galls.; ready-to-drink equivalent, 125,565,000 galls.

"Quick" potato flake is packed in 2 lb. polythene/metathene bags, each producing 12 lb. of creamed potatoes. Cooking instructions are also included. Bags are packed 6 to the case.

Campbell's export to 46 countries

Campbell's Soups, Ltd., say that the products of their plant at King's Lynn, Norfolk, are now being exported to 46 countries throughout the world, including the Continent, Africa, Australia, Hong Kong, Jamaica, Malaya, Japan and Iceland. About 93% of the purchases for manufacture come from the U.K. The company is planning for expansion in all markets.

New BCL Spanish quarterly

The first of a new quarterly magazine called "Mejor Envasado" ("Better Packaging") written entirely in Spanish, has been published by British Cellophane, Ltd. The aim of the magazine is to give business men in Spanish-speaking countries news, ideas, and information concerning the use of transparent films in packaging.

Britain well represented at A.N.U.G.A.

For the first time the British Food Manufacturing Industry made a big joint effort to boost overseas sales. The Food Manufacturers' Federation in co-operation with the Board of Trade sponsored a British Food Exhibit in the International Exhibition of Fine Foods and Provisions (A.N.U.G.A.) held in Cologne from September 23 to October 1.

The British exhibit, nearly 4,000 sq. ft. in area included many well known British manufacturers and the display covered a very wide range of finest quality foods and beverages.

British food and drink are being exported to all parts of the world in substantial quantities, and Western Europe already represents a good market. The F.M.F. are convinced that this market will expand substantially in the future and that the joint venture will help to strengthen the promotional efforts made by individual firms.

The F.M.F. hope this venture will be a successful part of the continuing drive to boost exports of British foods and it is confidently expected that there will be further joint efforts at other important overseas food exhibitions in the future.

B.S. for bulk handling couplings

Produced at the request of the National Association of Corn and Agricultural Merchants, a new British Standard, B.S. 3362/1961, lays down materials and full dimensions for screwed couplings of the fire hose type, which have been specially simplified for use with bulk vehicles when only one man is available for coupling and uncoupling.

Another design, of American origin, is shown in an appendix, together with adaptors. This design may be introduced into the standard later if it proves satisfactory in use.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 4s. each. (Postage will be charged extra to non-subscribers.)

Degree courses in food science to begin at Leeds

New courses, leading to Honours and Ordinary B.Sc. degrees in Food Science, have been introduced at the University of Leeds. The first students for these courses will enter the University in October, 1962. The Honours course extends over four years, and includes chemistry, physics, biology, statistics, bacteriology and biochemistry, taken in the appropriate pure science department in the first years. This is followed by courses in the chemistry, physics, and microbiology of foodstuffs and food processing.

The Ordinary degree course is restricted to three years. Entry requirements include a high standard in chemistry and physics, with mathematics as the preferred third subject.

Social highlights of the Brewery Convention in Vienna

The British contingent departed on May 13 and 14 by B.O.A.C. *Britannias* for the 8th International Congress of the European Brewery Convention in Vienna. Altogether 280 people from the British Isles attended, and this compares very favourably with the estimated total of 1,400, which is the largest number of any Congress so far.

The Congress began officially on Sunday, May 14, when a reception was held to welcome members and their ladies in the Ceremony Hall of the "Neue Hofburg" which is, in itself, a place of great historical interest. The Ceremony Hall was employed also as a place where members could discuss problems informally during the technical sessions later in the week. Perhaps a reason for this was the continual provision of refreshments.

During the remainder of the week members attended performances of the Spanische Reitschule and the Vienna State Opera. The former is the only one of its kind in the world, and its origins date from 1580. The unique riding style was developed in Vienna, and the performance as a whole satisfied the experts in the audience. The performance of "Der Rosenkavalier" by the State Opera was of the highest standard. The magnificent building which houses the State Opera is of very recent origin, the original having been demolished during the Second World War.

To many the highlight of the Congress may have been the Heurigen-Abend in the Monastery of Klosterneuburg near Vienna. Such occasions are traditional in this district. The organisation of this event was very impressive, especially when one considers that 1,400 people had to be conveyed by coach, over very difficult roads. The journey to Klosterneuburg took us through Grinzing, a truly beautiful district, famous for its "Heuriger" wine-taverns and where the vintner sells his own wine. From Grinzing the road ascended to the Hohenstrasse, from which one obtains a view of Vienna and the Danube of unparalleled beauty. After this we passed through a part of the famous Vienna Woods, and then began the descent to Klosterneuburg. The excitement stimulated by this journey was sustained in the Stiftskeller of the age-old Monastery where the "Heurigen" evening was held. No one person could have failed to be impressed with the food, wine and the atmosphere which prevailed during the evening. This was an occasion when technical problems were forgotten and members began to relax. Indeed, a truly memorable way in which to end the Congress.

The Research Centre of the Fermentation Industry in Vienna were our hosts on these social occasions, and it would be fitting to say that all members of the British contingent are truly indebted to the members of the Research Centre. At the same time it would be fitting to acknowledge the hospitality of the Schwechat, Liesing and Ottakring breweries.

In conclusion, this was a most enjoyable Congress socially, and of a very high standard technically. One wonders how many people will attend the next one, but it is certain that there will be at least 1,400 members.—J. HOGGAN.

This roof, 130 ft. wide, is the second largest clear-span in the country and will cover the vehicle despatch hall of Savage's new Mothers Pride bakery at Coventry, the foundation stone of which was laid on July 6. Costing £600,000 and equipped with Baker Perkins baking, heating and ventilating plant, it will have two production lines, one a fully automatic line baking the main supply of "Mothers Pride" bread, and the other a partly-automatic hand-fed line baking smaller amounts of speciality loaves. Total output will be about 4,000 loaves per hour. The bakery, which will employ about 200 people, is expected to be in operation next summer.

Raw cocoa usage increased

M.A.F.F. estimates that 20,300 tons of raw cocoa were used by manufacturers in the U.K. during the 13 weeks ending July 1. This compares with 20,100 tons in the 13 weeks ending April 1, and 19,200 tons in the 13 weeks ending June 25, 1960.

Census of Production, 1958

Part 11, Milk Products, Part 15, Animal and Poultry Foods, and Part 131, Water Supply, of the Report of the Census of Production for 1958 are now obtainable from H.M. Stationery Office, price 2s., 2s., and 1s. 9d. respectively (postage 2d. extra in each case).

New S.C.I. group: Industrial Water and Effluents

A new subject group of the Society of Chemical Industry is being formed to be known as the "Industrial Water and Effluents" Group. It will be interested in all aspects of the science and technology of treatment, conservation and economic use of water, and of the treatment and disposal of effluents and will be under the chairmanship of Dr. B. A. Southgate, director of the D.S.I.R. Water Pollution Research Laboratory. Further particulars may be obtained from the General Secretary, Society of Chemical Industry, 14, Belgrave Square, S.W.1, or to the Industrial Water and Effluents Group Secretary, J. L. Hewson, Imperial Chemical House, Millbank, S.W.1.

Revised British standard for butter

A revised British Standard for the chemical analysis of butter (B.S. 769: 1961) includes modifications to a number of the standard methods of analysis as well as a new clause relating to the acidity of butter fat.

Copies of the standard are available from the British Standards Institution, Sales Branch, 2, Park Street, W.1, price 7s. 6d. each. (Plus postage for non-subscribers.)

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A NEW SERVICE FOR FOOD MANUFACTURERS

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Exact reproduction of any flavour from your own formulae under conditions of the strictest secrecy.

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3

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5

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Fourth International Congress on Canned Foods

The general report on the 4th International Congress on Canned Foods held in Berlin from May 15 to 18 will be published soon. The number of copies printed will be limited to those ordered. Orders are now being sought by the General Secretary of the Comité International Permanent de la Conserve, 3 Rue de Logelbach, Paris 17e, from whom order forms may be obtained.

Ultrasonic pig testing by P.I.D.A.

To help pig producers select their best breeding animals quickly and cheaply, the Pig Industry Development Authority are introducing a pilot scheme for the testing of gilts by an ultrasonic instrument under ordinary farm conditions. The scheme will be the first of its kind in Europe.

It started on September 1 and at present is being confined to members of Part I of P.I.D.A.'s recording scheme in Bedfordshire, Buckinghamshire, Hertfordshire, Middlesex and Essex. It may be extended later after experience has been gained.

A specialist operator will take ultrasonic measurements of fat depths of gilts weighing between 190 and 210 lb. If requested, measurements will also be taken in liveweight ranges of 125 to 135 lb. and 240 to 260 lb.

The leanness of the gilts will be calculated from these measurements. Speed of growth will also be recorded. The measurements will help producers to choose their best gilts as breeding stock.

New Kestner factory

On July 15, the president of the Kestner Evaporator and Engineering Co., Ltd., of London, unveiled a plaque to commemorate the inauguration of their new foundry at Greenhithe. This foundry is the first part of the complete move of their works from New Cross to Greenhithe. Other shops that will be transferred will be the Keebush production and machine shop, grinding, pump assembly and test, Keeglas and PVC fabrication, general plant erection and heavy plant erection, and finally the general laboratory, pilot plant, and test laboratory. A new drawing office is being built to house 60 draughtsmen. On completion the factory floor area will be some 100,000 sq. ft. The move will be completed in about six months.

Meat nutrient losses during processing

A booklet (AMIF publication F-437) reporting the results of studies made by the American Meat Institute Foundation and showing that although standard processing or cooking procedures cause only slight loss of nutrients in meat proteins, severe heat treatment does have an adverse effect on the essential amino acid, lysine, and that this nutrient is not used to full advantage by test animals when products are heavily over-processed. Appropriate care should be taken, therefore, to avoid excessive heat processing of meat products. Copies of the booklet may be obtained from H. A. Armstrong, Chief of the Foundation's Division of Information and Service, 939, East 57th Street, Chicago 37, Ill., U.S.A.

Baker Perkins' new offices opened

The new offices of Baker Perkins (Exports), Ltd., at Westwood House, Stanhope Gate, London, W.1, were opened recently.

Industrial Training Council report

The part played by the National Board for Bakery Education, the Food Manufacturers' Federation, and the Institute of Meat in the work of the Industrial Training Council is described in its Second Report covering the period January, 1960, to March, 1961.

The main function of the I.T.C. is to try and ensure that in each industry a strong lead is given by the employers' organisation working in co-operation with the trade unions to assist both in improving training generally, and in dealing with the problem of the "bulge." The report includes brief accounts of the action taken by these organisations in some 36 industries during the period under review.

The report can be obtained from the offices of the Council, 36, Smith Square, London, S.W.1, price 1s. 3d. exclusive of postage.

News from Scotland

Broiler rabbits in Fife

Plans are afoot to launch commercial production in Fife on a large scale of rabbit meat for the English and Continental markets. Already six Fife farmers have added rabbits to their stock and are finding the animals a profitable investment. A drive is planned to increase the county's interest in the project which is visualised, not only as a large-scale sideline for farmers, but the type of back-garden business in which householders seeking a profitable hobby will be keenly interested.

The Fife output of rabbits will eventually be processed and prepacked at a factory to be built in the Dundee area, where Board of Trade assistance is likely to be available because of the incidence of unemployment.

Big Aberdeen bakery in link plan

Another of Britain's big bakery concerns has won a foothold in Aberdeen as a result of recent negotiations with John Ledingham and Son, Ltd. It was announced recently that the Aberdeen bakery firm had come to a "working agreement" with Rank Organisation through Beattie's Bakeries Ltd., Glasgow.

Mr. R. G. Ledingham, head of the firm, said that under the new set-up the name of Ledingham would be continued, and he would carry on as chairman and managing director. He said he was glad it had been agreed that Ledingham's would continue. His main reason for entering into this arrangement was to ensure the continuity of the firm as a high-class bakery business.

He had also kept in mind the interests of his staff. The number of employees involved is 120.

Beattie's Bakeries, Glasgow, are a subsidiary of Ranks and own the firm of Nicoll and Smibert—a Dundee firm with branches in Aberdeen and Stonehaven—and Murray's of Fochabers. Mr. Ledingham is a grandson of the founder of the firm, which started in Aberdeen in 1873.

Biscuit department to close

Bilsland Brothers, Ltd., bakers, Glasgow, have closed their biscuit department at Hydepark Street, Glasgow. Some workers will be offered alternative employment, but others will be discharged. Those declared redundant will receive compensation based on length of service.

The decision to close the department has been brought about by the changing public taste in the choice of biscuits.

The biscuit department is relatively small, and it was felt that the company should conform to the modern trend by buying more through outside manufacturers.

Russians order potato crisp factory from Dundee

A Dundee engineering firm, Robert Kellie and Son, Ltd., a subsidiary of the Vokes Group, have secured a contract worth some £400,000 from the Russian Government. The order is for the supply of equipment for a large potato store and all the contents of a complete factory to produce and pack potato crisps, pre-cooked and deep-frozen potato chips, and potato cakes.

Lightnin Mixers Scottish agents

Lightnin Mixers, Ltd., the Poynton (Cheshire) firm of fluid mixing machinery manufacturers, have appointed Messrs. Geesin and Read of Glasgow as their technical representatives in Scotland.

PEOPLE

MR. R. L. SANFORD is the new chairman of Nabisco Foods, Ltd., replacing MR. V. B. DIEHL, who has returned to U.S.A. to become assistant to the president of the parent organisation.

*

MR. S. SWEETMAN has been appointed chairman of Van den Berghs and Jurgens, Ltd., succeeding MR. A. J. C. HOSKYNS-ABRAHALL who has joined the Unilever board.

*

MR. D. G. ELIAS has been appointed a director of Simon-AMF, Ltd., MR. G. O. FRASER is now the New York director and MR. J. M. MELLOR has been appointed commercial director.

*

MR. C. P. STEPHENS has been elected a vice-president and head of the technical division of the Coca-Cola Export Corporation.

*

MR. W. MORRIS, secretary, and MR. F. W. PRICE, sales manager, have been appointed directors of the Colt Associated Companies.

*

MR. J. W. HOUSE has been appointed marketing manager of the Kenya Coffee Co., Ltd., a part of the John Gardner Organisation.

*

DR. F. RECALDE, former director of the National Institute of Nutrition in Ecuador, has joined the staff of the Food and Agriculture Organisation as a nutrition officer.

*

MR. H. J. WENBAN has relinquished his position as managing director of the Forgrove Machinery Co., Ltd., one of the Baker Perkins Group. He will continue to act as chairman and MR. W. A. B. BROWN has been appointed managing director in his place.

*

MR. P. HOYLE has been appointed to the board of Rownson Conveyors, Ltd., one of the Baker Perkins Group. He retains his position as deputy manager of the bakery machinery department of the parent company.

*

MR. F. W. EDMUNDS has been appointed area sales manager in the Southern coast area of the Buxted Chicken Co., MR. N. L. SHARROCK to the newly-created position of sales administration manager and MR. S. SPILSBURY area sales manager for the East Midlands area.

*

DR. A. E. BENDER has resigned his post as head of the Research Department of Bovril, Ltd., to take up an appointment as head of the newly-established Research and Development Department of Farley's Infant Food, Ltd.

Mr. R. L. Sanford

Mr. S. Sweetman

MR. L. S. MUIR has been appointed to the board of T. Wall and Sons (Ice-Cream), Ltd., MR. J. A. WINNEY has become the new multiple sales controller, MR. A. R. JARROLD has taken over as general manager of the Scottish region, MR. W. C. NICHOLSON becoming Northern regional manager in his place.

*

MR. B. E. MIDDLETON has become Packaged Goods Representative for the Bristol and Gloucestershire areas for Brown and Polson, Ltd.

*

Coates Brothers Inks, Ltd., have appointed MR. H. LANKWARDEN as technical service consultant to Drubin's, their agents in Copenhagen, and MR. J. WINTERBURN has joined the company as a home sales representative for the Northern area.

MR. J. WHITWELL, until recently general manager in Sydney, has become secretary and director of Coates Brothers, Australia Pty., Ltd.; MR. C. M. SHAW is now chief technical manager and MR. A. E. BAKER general manager.

DR. J. D. SAUNDERS has been appointed chief technical manager in Auckland for Coates Brothers (New Zealand), Ltd.

Obituary

MR. F. R. DIXON, assistant managing director of H. S. Whiteside and Co., Ltd., and a director of many companies within the Whiteside Group, has died.

*

MR. G. W. MUDDIMAN, chairman of Birds Eye Foods, Ltd., from 1946 to 1956, collapsed and died on September 12 on the golf course at Cooden, near his Bexhill home. He was 68.

International Association of Seed Crushers

The 39th Congress of the International Association of Seed Crushers was held in Stockholm from June 6 to 9 at the invitation of the Swedish Seed Crushers' Association, when 800 delegates and guests from 28 countries met under the Chairmanship of the Association's President, Mr. Guy Chipperfield, C.B.E.

The President reviewed the Association's work during the past year, and reports were received from the Association's committees and from member countries. Special meetings were held to discuss copra sampling and analysis and quality of America soya beans.

Papers read at the Congress included: Mr. J. C. A. Faure (Great Britain) on "The World Oils and Fats Position"; Mr. R. Golseth (U.S.A.) on "The U.S. Situation in Fats and Oils"; Mr. Howard L. Roach (U.S.A.), President, Soybean Council of America, on that organisation's activities; Mr. A. Bakker (Holland), President of the International Federation of Margarine Associations, on "Margarine"; Mr. G. Broche (France) on "Freedom of Trade"; Dr. Goesta Andersson (Sweden) on "Growing Rapeseed in Europe." Director Coppola (Italy) presented a report on the "Olive Oil Industry."

The following appointments were made for 1961/62: Mr. Guy Chipperfield was re-elected president for the 11th successive year; Mr. E. Griffiths (France), senior vice-president; Mr. C. A. C. de Boinville (Great Britain), 2nd vice-president; and the secretary, Mr. A. E. Peel (Great Britain), was re-elected.

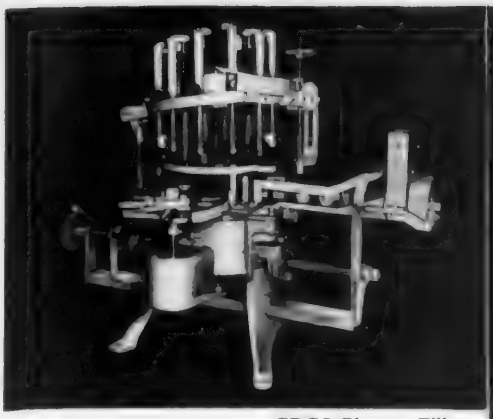
The French Seed Crushers will be the hosts for next year's Congress, which will be held in Cannes from June 5 to 8.

Forthcoming Meetings

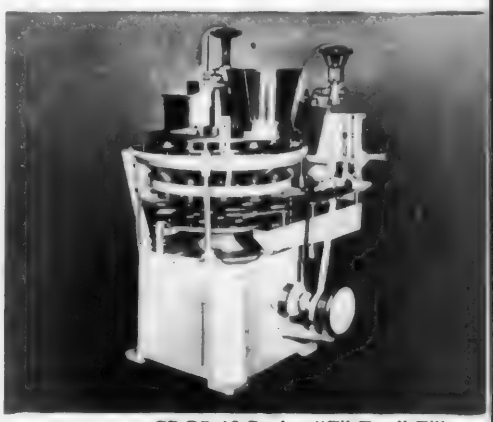
Borough Polytechnic, Borough Road, London, S.E.1, symposium on "Freeze-drying of Foodstuffs," Oct. 19 and 20.

S.C.I. Food Group, 14, Belgrave Square, London S.W.1: Wednesday, October 11, 18.15, "A Preliminary Investigation into the Compounds Responsible for Meat Flavour," by A. E. Bender, and "The Composition of Blackcurrant Juice," by R. Swindells. Wednesday, October 25, 18.15, Nutrition Panel meeting, "Foods Low in Salt."

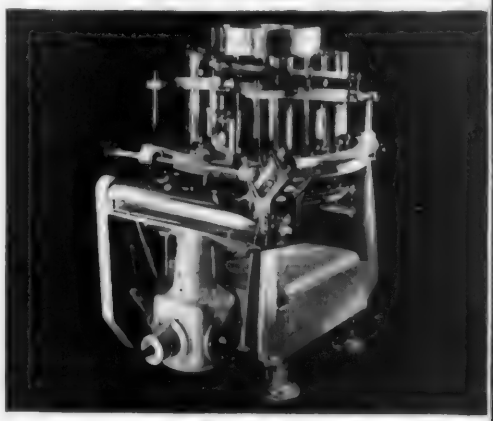
Sir John Cass College, Jewry Street, Aldgate, London, E.C.3: six lectures on "Brewing Microbiology" will be given on Wednesdays at 17.30, beginning on Wednesday, October 11, the subjects being "Brewing Yeasts," "Pure Culture Brewing," "Microbiology of Continuous Fermentation," "Wild Yeasts," "Bacteria in Brewing" and "Microbiological Control in the Brewery." (Chairman at each lecture is H. J. Bunker.) Fee for course —£1.



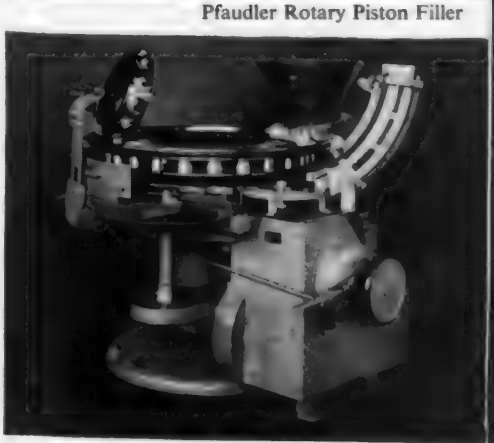
CRCO Plunger Filler



CRCO 12-Pocket "Fil-Fast" Filler



Pfaudler Rotary Piston Filler



CRCO Hand Pack Filler

Precision Fillers for all duties

Mitchell Engineering Ltd. manufacture or supply high-speed filling machinery for handling most types of food:—peas, beans, baby foods, purees, spaghetti, stewed steak, animal foods, solids and semi-solids, brines, syrups and oils. These are only a few of the products filled on Mitchell built or supplied equipment.

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SOLE AGENTS AND LICENCEES FOR
CHISHOLM-RYDER CO. INC.
and the PFAUDLER CO.

OVERSEAS NEWS

ANGOLA

Sugar production

Production of raw sugar in Angola in the first quarter of this year totalled 24,198 tons, as compared to 16,326 tons in the corresponding period of 1960.

ARGENTINA

Sugar law

The sugar industry has been promulgated by law to be of public interest and the government has been authorised to expropriate, or intervene in the management of, the sugar mills.

Supermarket investment

An investent of U.S. $1\frac{1}{2}$ million to establish five supermarkets in Buenos Aires has been approved by the Ministry of Economy.

AUSTRALIA

Dairying research

The government has allocated £A250,000 for research in the dairy industry during the next 12 months, £A60,000 higher than last year.

Record butter production

Total output of butter was 309,000 boxes during the past financial year, an increase of over 4% on the previous year. Production during May, 1961, amounted to 21,275 boxes, 24% more than during May, 1960.

Increase in sale of dried fruits expected

The Dried Fruit Board in Melbourne said that sales of dried fruit at home and abroad were expected to increase to 81,000 tons, 14,000 tons more than last year.

COLUMBIA

Sugar exports

Sugar exports in the first three months of 1961 amounted to 5,454 tons, worth U.S. $600,000.

DOMINICAN REPUBLIC

Price controls

The government has started a campaign to reduce the cost of living and to improve the foreign purchasing power of the peso so that it remains on a par with the American dollar. Price controls have been applied to a number of foods, including pasteurised milk, sugar and rice, and the government will take strong action against any merchant trying to speculate on rising prices.

GHANA

Oil factory

Work on the £30,000 oil factory at Tamale is expected to be completed within two months. The factory will produce about five tons of oil a day from shea-nuts, soya beans and groundnuts.

HOLLAND

Dairy production

Dairy production for the first quarter of this year amounted to 145,300 tons, compared with 151,100 tons last year.

Plastic cheese hoops

An industrial enterprise in the plastic products line at Assen, Holland—Industriële Onderneming "Bekro" N.V.—manufactures white plastic cheese hoops claimed to have the following advantages: the covers fit exactly into the hoops, the formation of "rim cheese" thereby being practically avoided; the cheeses cool down gradually owing to the insulating effect of the plastic; they are unbreakable, hard wearing, light in weight and easy to handle; and the inner wall is so smooth that the curd sinks down of its own accord, resulting in a 30% or more saving in labour.

INDIA

Training course

Twenty-nine students from eight Afro-Asian countries took a course of training in the latest methods of milk production, processing, product manufacture and distribution in the tropics. The course was sponsored jointly by the Indian and Danish Governments.

Production to start in second dairy

A second dairy, situated near Calcutta, is expected to start production by the end of this year and will initially provide 40,000 gallons of milk a day, to be increased later to 48 gallons. Installation of the machinery, donated by U.N.I.C.E.F., the Colombo Powers and the American Technical Corporation Mission, started recently.

Milk production schemes

Greater importance will be placed on schemes of milk production in rural areas, with plans for the marketing of surplus milk in urban areas. The collection and supply of milk will be the function of the network of producers' co-operatives in the villages.

JAMAICA

Drop of fresh milk supplies

During the first quarter of 1961, fresh milk supplies by dairy operators dropped by about 400,000 quarts, as compared to the corresponding period of 1960, when 2,242,534 quarts were delivered. Cause of the reduction is stated to be the long dry spell that lowered the level of feeding grasslands.

KENYA

New tea factory

A new £52,000 tea factory has been built in the Rift Valley Province and an even larger plant will be built as processing demands increase.

NEW ZEALAND

Dairy produce

Butterfat processed during the 11 months to the end of last May was 481,300,000 lb. Butter production totalled 211,744 tons and cheese production amounted to 98,177 tons.

Dairy merger

A Bill introduced into Parliament by the Dairy Production and Market-

ing Board authorises the long-planned merger of the Dairy Products Marketing Commission and the Dairy Board.

Sales drive for meat and dairy produce

The Minister of Overseas Trade stated that a sales drive for meat and dairy produce is to be conducted in the Caribbean and Central America.

NYASALAND

Fish canning industry

Experiments are being conducted to set up a fish canning industry at Nkata Bay, on Lake Nyasa, by Government fishery officers.

PARAGUAY

Healthy livestock means increased production

F.A.O. expert says that the number of cattle could be increased from 5 million head by 50% within the next ten years if the cattle are sound and healthy and if farms and ranches are well-managed with good pastures, fenced fields and adequate water.

PHILIPPINES

British restrictions lifted

The lifting of British quantitative restrictions on canned pineapples from the dollar area will improve Philippine sales in this category.

SPAIN

Milk centres

Two milk pasteurisation and distributing centres are being erected in Madrid. Each will have a daily capacity of 200,000 litres.

Experimental Centre for Refrigeration

The Four General Assembly of this centre will be held at Valencia from November 6 to 11, under the sponsorship of the National Fruit and Horticultural Products Syndicate.

SOUTH AFRICA

Fishing industry

Satisfactory catches of pilchards and maasbanker have been obtained for the season ended July 31. Rock lobster catches for June were affected by unfavourable weather conditions and reflected a slight decline from the previous month's production.

Citrus juice plant

A R900,000 citrus juice plant has been opened in the North Eastern Transvaal. Oil and cattle feed will be produced from the peel.

Commonwealth sugar agreement

South Africa's membership of the Commonwealth Sugar Agreement will end on December 31, following her departure from the Commonwealth. The British Government will support any South African bid for a separate international sugar quota. Meanwhile, further discussions between Britain and South Africa will be held with a view to establishing bilateral arrangements for trade in sugar between both countries after next January 1.

SWITZERLAND

International aerosol exhibition

The exhibition will be held in the Kunst- und Kongresshaus in Zurich from October 4 to 8 inclusive. Entrance is free and the exhibition is open to the public.

U.S.A.

Pepsi-Cola sales records

Earnings for the first six months of 1961 exceeded records for any initial half-year in the history of the Pepsi-Cola Co. A special division has been formed to market the company's new beverage products.

World-wide Coca-Cola bottling plants

By the end of this year there will be Coca-Cola bottling plants operating in 112 countries reports the chairman of the board.

New aluminium foil can

A spiral-wound laminated aluminium foil can, first used for frozen juices, has been developed. The cans are believed to be less expensive and lighter than tin-plate or aluminium cans.

UGANDA

Record tea production

Manufactured tea in May was a record at 1,172,204 lb.

VIETNAM

Five-year plan

Private efforts to expand the production of canned food are emphasised in the five-year economic development plan and the creation of four new sugar refineries is anticipated. If the implementation of the five-year plan is successful, Vietnam will meet her own needs in white sugar.

Technical Press Review

Milk and Cheese in the Netherlands . . .

are reviewed in the October issue of **Dairy Engineering** and a look is taken at the Pure-Pak Milk Carton System. An account of the Flavouring of Milk and Ice Cream is also included.

Automation Progress discusses the Cryotron—a Superconducting Computer, and studies Maintenance for Automation.

Computer Control in Processing forms the subject of a special feature in **Chemical and Process Engineering** and an article on the Design of Climbing Film Evaporators is also included.

Exhibitions and the Common Market are considered in **Conferences and Exhibitions** and notes on Planning a Conference Newspaper are given.

Corrosion in Transmission and Distribution is examined and Submarine Corrosion Detection by Television is described in **Corrosion Technology.**

Some Recent Developments in Resin Finishing of Textiles are considered, and Foambacks—Their Properties and Uses, are described in **Fibres and Plastics.**

A report on Tablet Formulation is given in **Manufacturing Chemist,** which also explains How Big a Storage Tank Should Be.

A description of the Construction of the Quebec--Cartier Railway is given in **Muck Shifter and Bulk Handler,** which also comments on the Hire Purchase of Earth Moving and Bulk Handling Plant.

A series on the Physical Chemistry of Paint is started in this month's **Paint Manufacture** and Some Aspects of Modern Dispersion Methods are dealt with.

The Russian Petroleum Industry is described in **Petroleum** and an article on Refrigeration in the Petroleum Industry is included.

Specimen copies of these journals can be obtained by writing to the Circulation Manager, 9, Eden Street, London, N.W.1.

New Companies

High Trees Packers, Ltd. (693252.) High Trees, High Roding, nr. Dunmow, Essex. Packers of and dlrs. in potatoes, fruits, etc. Dirs.: G. C. Stevenson, K. Hawes and F. W. Sexton.

Northern Bacon and Canning Co., Ltd. (F. 5041.) 14, West Smithfield, London, E.C.1.

Proper Food Products, Ltd. (F. 5042.) 14, West Smithfield, London, E.C.1.

G. C. Prepared Meats, Ltd. (693587.) Clifford's Inn, Fleet Street, London, E.C.4. Subs.: W. H. Willcocks and Jean L. Fairfax.

Prepacks (Braintree), Ltd. (693654.) The Fox Inn, Finchingfield. Potato and other vegetable and fruit processors, etc. Dirs.: J. King and G. F. De Pear.

A. and T. Aspinall, Ltd. (693760.) 37, Higher Bents Lane, Bredbury, Cheshire. Bakers, confectioners, pastry cooks, etc. Dirs.: A. Aspinall and T. Aspinall.

Ceres Foods, Ltd. (694404.) Mnfrs. of and dlrs. in all kinds of foodstuffs (except food fats and food oils and margarine), etc. Dirs.: R. Hood and J. Weber.

Bilipak, Ltd. (694304.) Mnfrs. of and dlrs. in tubes, sachets, boxes, cartons, etc. Dir.: S. M. Levy.

Rich Foods, Ltd. (694282.) 52, Gloucester Place, London, W.1. Dirs.: I. Rich and Doreen T. Rich.

Ace Refrigeration, Ltd. (694191.) 1, Fredericks Place, Old Jewry, London, E.C.2. Subs.: F. J. Wild and G. A. Whaley.

Laynes Green Processing Co., Ltd. (694126.) The Laynes, Vicarage Lane, Eltham, Kent. Apple and other fruit processing, etc. Dir.: E. J. Bates.

W. J. Soper (Spitalfields), Ltd. (693971.) 104, Commercial Street, London, E.1. Packers of and dlrs. in fruit, vegetables, etc. Dirs.: W. J. F. Soper and R. Berkman.

M. & E. R. (Ice Cream), Ltd. (693955.) 18a, Halesowen Road, Old Hill, Staffs. Dirs.: C. H. Mander and D. R. Britton.

Murrays (Confectioners), Ltd. (695306.) 70, Acre Street, Lindley, Huddersfield. Bakers and pastrycooks, etc. Dirs.: D. Murray and P. Murray.

R. G. Bridges, Ltd. (695477.) The Wholesale Market, Bank Square, Burton-on-Trent. Growers, processors, canners, bottlers, dlrs. in fruit, vegetables, flowers, etc. Dirs.: R. G. Bridges and N. W. Griffiths.

Teesfreeze, Ltd. (695819.) 159, Neasham Road, Darlington. Ice cream mnfrs. and dlrs., etc. Dirs.: K. Clement and Eileen P. Clement.

Ray Cheney (Pontypool), Ltd. (695937.) 33, West Bute Street, Cardiff. Ice cream and iced foods vendors and mnfrs., caterers, etc. Dirs.: R. F. H. Cheney and Mrs. J. N. Cheney.

Universe Foods (Middlesex), Ltd. (694585.) 183, Heath Road, Twickenham, Middlesex. Bakers, confectioners, butchers, sausage mnfrs., etc. Dirs.: A. Jansen and F. A. D. Cripps.

Willett Brothers (Chesterfield), Ltd. (694592.) 57, Saltergate, Chesterfield. Mnfrs. of and drs. in confectionery, chocolates and cooked and prepared foods of all kinds, etc. Dirs.: R. C. Willett and B. C. Willett.

Leabess Supermarkets, Ltd. (694845.) Spear Works, Derby Street, Manchester, 8. Foodstuff mnfrs. and dlrs., etc. Dirs.: L. Giersh and L. F. Hoad.

Registers and Equipment, Ltd. (694861.) 112, Kensington, Liverpool, 7. Food machine makers, etc. Dirs.: W. B. Forrest and W. A. Loadman.

Creme-de-Lite, Ltd. (695185.) 18a, Halesowen Road, Old Hill, Staffs. Ice cream mnfrs., etc. Dirs.: J. Morris and G. W. Britton.

Kartona Fruit Juices (Cheshire), Ltd. (695210.) 13, Vernon Street, Hazel Grove, nr. Stockport. Dirs.: G. H. Barnshaw, A. R. Willmer, H. Barnshaw.

Ferrari's Bakery, Ltd. (695261.) 36, Dean Street, Aberdare. Dirs.: L. Ferrari and R. Ferrari.

Tuke Supplies (Reading), Ltd. (695947.) 44, South Steet, Reading, Berks. Mnfrs. of and dlrs. in foodstuffs, etc. Dirs.: A. R. F. Hynes, H. G. Tuke and J. P. R. Whelon.

West Yorkshire Meat By-Products, Ltd. (695948.) Mnfg. and dlng. in butchers' offals and sundries, etc. Subs.: I. G. Williams and T. G. M. Buckley.

Crysant, Ltd. (695955.) Mnfrs. of and dlrs. in soluble tea and process food, drinks, etc. Subs.: J. P. Raisman and T. A. R. Elmer.

Covelli's Ice Cream, Ltd. (696522.) 16-18, Truman Street, Kimberley, Notts. Ice cream mnfrs. and confectioners. Dirs.: R. P. Covell and Mrs. B. E. Covell.

Wren General Merchants, Ltd. (696609.) Mnfrs. of and dlrs. in foodstuffs, etc. Subs.: Dorothy M. Graeme and P. G. Graeme.

Laurence Kingston (Rayners), Ltd. (695991.) 4-5, North Street, Quadrant, Brighton, 1. Packers, canners, and preservers of and dlrs. in meat, game, etc. Dirs.: L. C. Kingston, R. J. Kingston, D. G. Kingston and B. L. Kingston.

Longford Packers, Ltd. (695093.) Old Mansion, St. Mary's Street, Shrewsbury, Salop. Potato washers and packers cd. on as "Longford Packers" at Longford Grange, Newport, Salop, etc. Dirs.: J. Elliot and G. T. Williams.

Snobell Frozen Foods, Ltd. (696655.) 2, Suffolk Lane, E.C.4. Subs.: L. G. R. Lines and Mrs. L. J. Anderson.

Castle Cary Dairy Products, Ltd. (696671.) Woodcock House, Woodcock Street, Castle Cary. Dirs.: W. H. Longman, W. J. Longman, R. E. H. Longman and G. R. Churchouse.

Ernest William (Drums), Ltd. (696076.) 29-30, Bedford Row, W.C.1. Mnfrs. of and dlrs. in drums, casks, etc. Dirs.: W. T. Jones and G. Harrison.

Fruit Equipment Manufacturing Co., Ltd. (697055.) 34, Spital Road, Maldon, Essex. Fruit grading equipment mnfrs. and dlrs., etc. Dirs.: P. A. Belcher and Phyllis M. Belcher.

Anderson and Woodthorpe (Oldbury), Ltd. (697107.) 39a, Dingle Street, Rounds Green, Oldbury, Worcs. Mnfrs. of and dlrs. in vermicelli, chocolate, couverture, confectionery and prepared foodstuffs of all kinds, etc. Dirs.: H. Woodthrope and J. Anderson.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

875,529. D. H. Ward: Closure for containers.

875,665. Lo Hung Hing: Cases or containers.

875,806. Hope and Sankey Hudson, Ltd.: Packaging of articles.

875,763. General Foods Corp.: Chewing gum having controlled flavour release.

875,855. Dow Chemical Co.: Coating composition for articles of food.

875,656. H. Ritter: Cooking devices.

875,747. Gaz de France: Continuous cooking oven for food products.

875,608. P. Carpigiani: Continuous ice-cream freezers and dispensers.

876,063. Brehmer Folding Box Co., Ltd., and H. H. Thompson: Cardboard or like boxes or cartons.

876,113. A.P.V. Co., Ltd.: Processing of brewers' wort.

876,290. Mather and Platt, Ltd.: Automatic filling machines.

876,372. J. I. Goto: Flour-milling process.

876,151. Rose Bros. (Gainsborough), Ltd.: Wrapping of bottles or like cylindrical articles.

876,153. Rose Bros. (Gainsborough), Ltd.: Cartoning machines.

875,996. Koniklijke Zeelandia H. J. Doelman N.V.: Machines for greasing and/or directing moulded portions of dough.

876,386. A. K. Mikkelsen: Method of cleaning and/or disinfecting the milking units of milking machines.

876,210. Geo. J. Meyer Manufacturing Co.: Filler valve for pulp drinks.

876,285. D. Pomeroy: Devices holding sausage skins.

877,349. A. Handtmann: Holding means for sausage dividing and twisting machines.

877,509. Food Machinery and Chemical Corporation: Carton filler.

877,216. Mahdrescherwerk Weimar Veb: Emptying device for grain bins.

877,193. L. A. Wadley: Dough shaping equipment.

877,288. Industriele Maatschappij Arnhem N.V.: Bottle conveyor.

877,099. Barry-Wehmiller Machinery Co., Ltd.: Crate unpacking and packing apparatus.

877,161. G. A. Seewer: Dough-rolling machine.

New patents are from the Journal of Patents. Permission to publish has been given by the Controller of Her Majesty's Stationery Office. The publication is obtainable from the Patents Office, 25, Southampton Buildings, London, W.C.2.

Outstanding Value...

Bedford-Hawson 3 ton Box Van !

670
CUBIC FT
CAPACITY

Body 670 cu. ft.—modern looking—practical. With sturdy construction and a 10-gauge steel underframe and hardwood floor. Built by volume production methods for a price of only £281.

Chassis Low-loading, low-priced Bedford chassis, with the famous cab-ahead-of-engine TK design, giving easy access, walk-through floor, sound-proofed comfort and superlative vision. Complete vehicle price, with 214 cu. in. petrol engine, £1,106; with 200 cu. in. diesel £1,226. Same body also available on TK 4 ton or 5 ton 135 in. wheelbase chassis.

Plus The unmatched advantages of Bedford's years of practical experience and technical know-how in the transport vehicle business. A product of the largest commercial vehicle factory in Europe.

PRICE COMPLETE

£1,106

Full details of this outstanding new van from your local Bedford dealer.

Better buy BEDFORD

Vauxhall Motors Ltd., Luton, Beds.

END CONDENSATION WITH

SECULATE

It's never too late to apply Seculate and put an end to streaming walls and dripping roof structure. You can brush or spray Seculate on to virtually any surface including wood, metal, concrete, plaster or brickwork. Once there it *stays* and you can say goodbye to condensation—even in humid conditions like canteens, engine rooms, cold stores, laundries, bathrooms and kitchens. Seculate prevents condensation by insulating the surface, and in highly humid conditions by absorbing the moisture. Fully descriptive literature is available or alternatively our Technical Representative will be pleased to discuss your particular problems on site.

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CHEAPER because new LIGHTNIN portable mixers are positively parsimonious in power requirements, because they deal with a whole range of exacting duties . . . handling most jobs at less cost.

SAVE COST of a corrosion-resistant alloy with this shaft chuck. It's way up out of the tank—always above liquid level. It's simple, quick acting. Tighten one screw, and the shaft is locked—can't come loose unless you want it to.

NO MYSTERY about the right mixer angle for best mixing. Vertical and horizontal indexing makes it a snap to describe the right setting so everybody understands.

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P.5921

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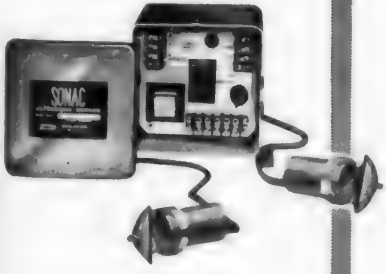
How could you use Westool 'Sonac'? **Automatic weighing. Size control. Sorting. Stacking. Counting. Package routing, etc., etc.**

For full details of Westool 'Sonac' sensing and switching, write for brochure.



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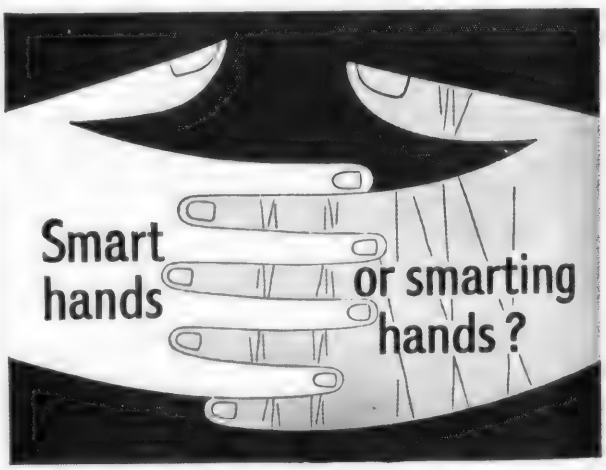

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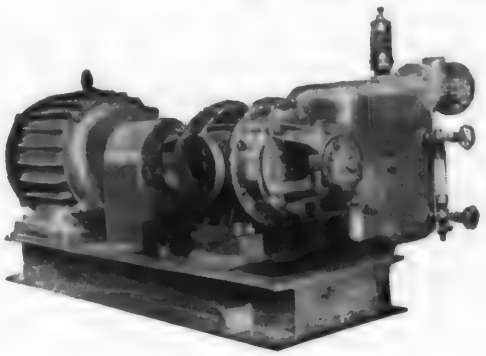

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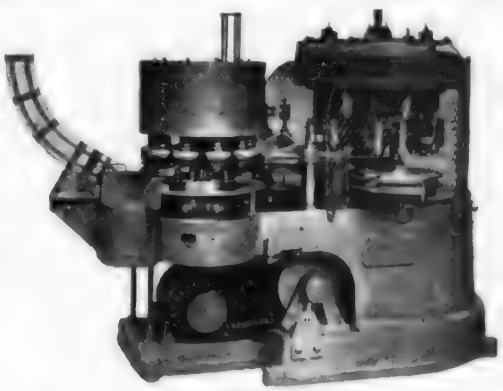

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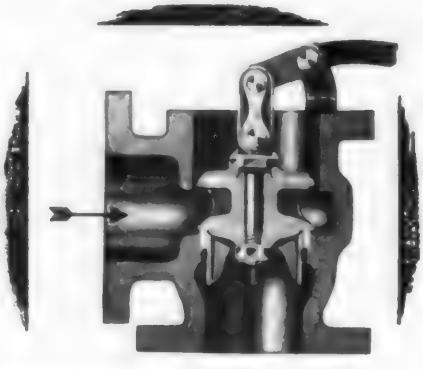

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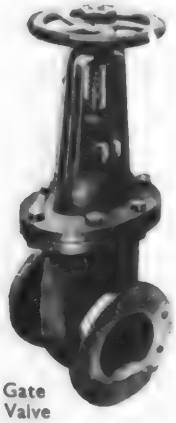

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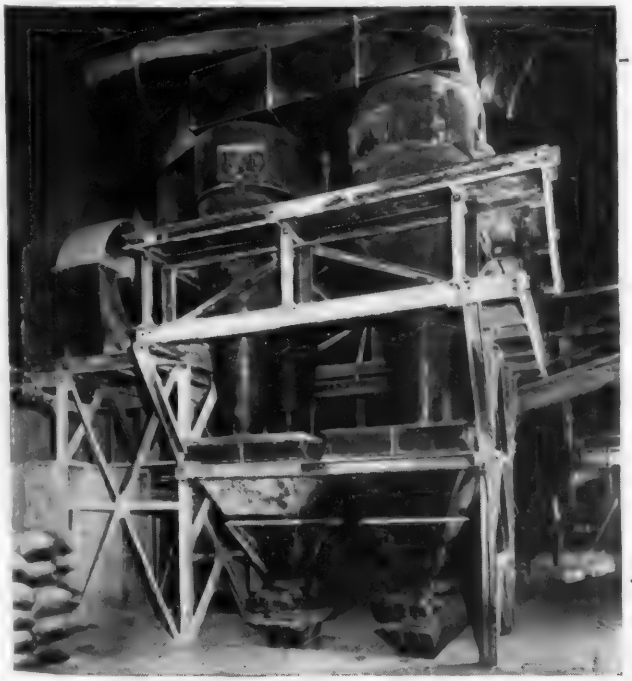

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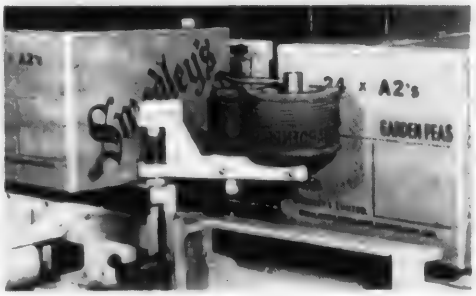

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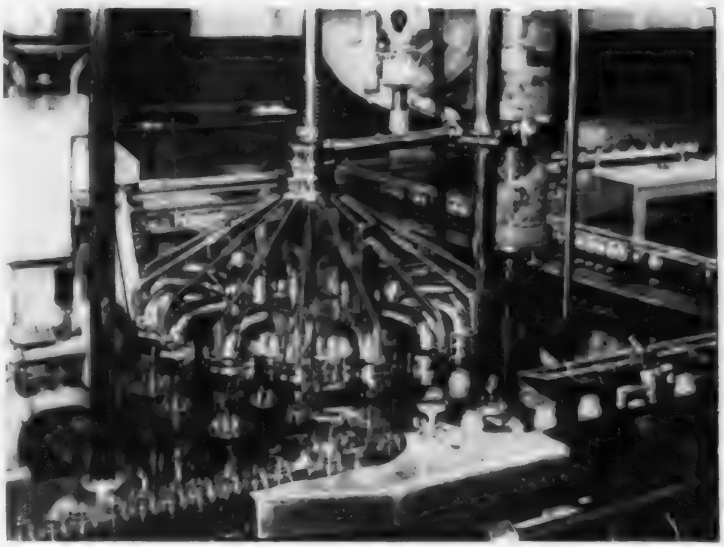

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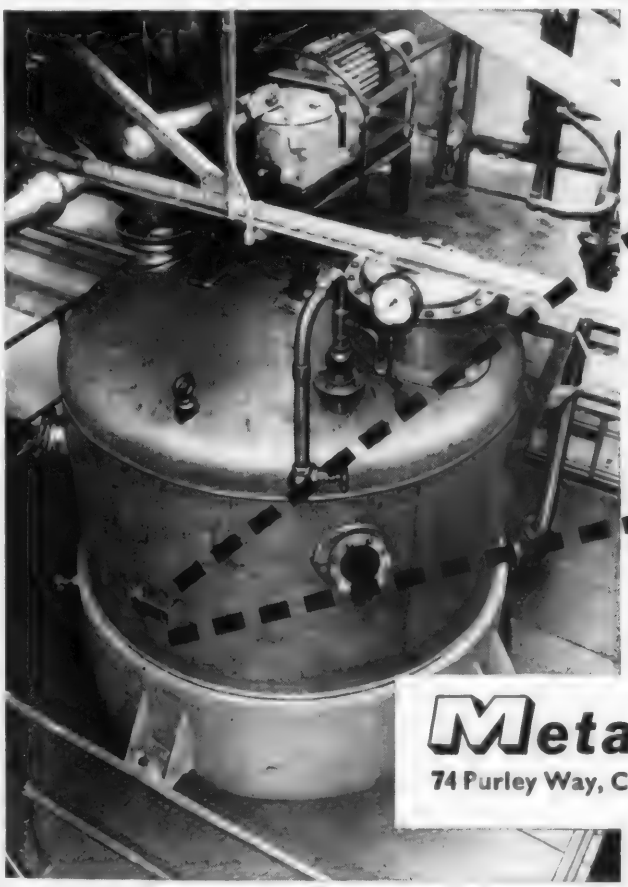

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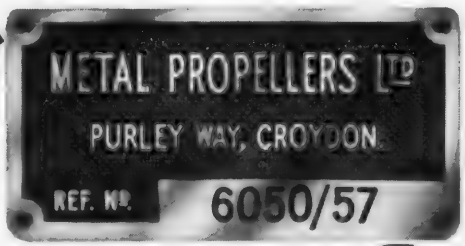

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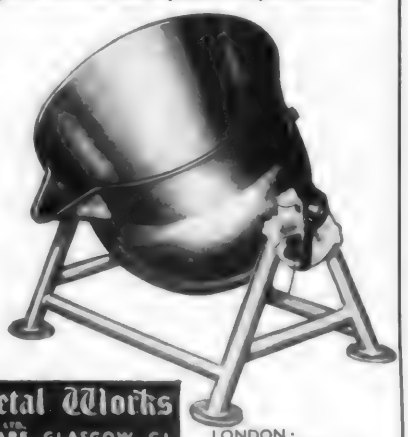

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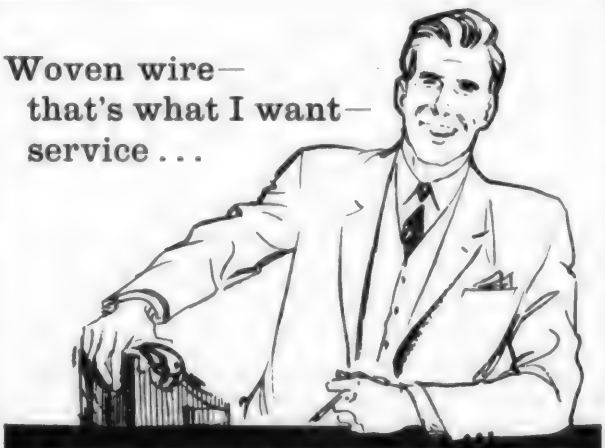

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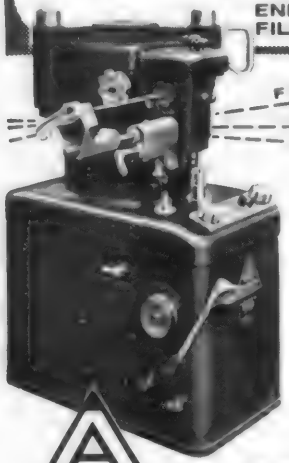

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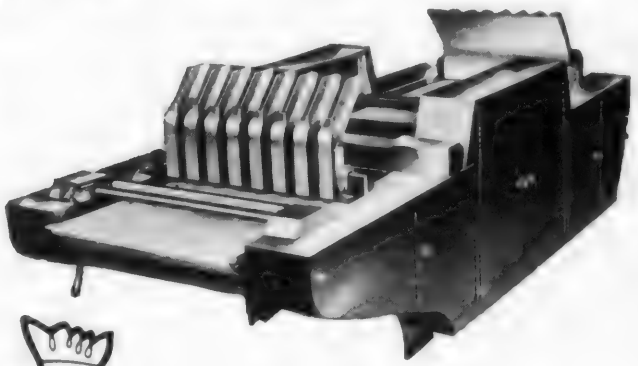

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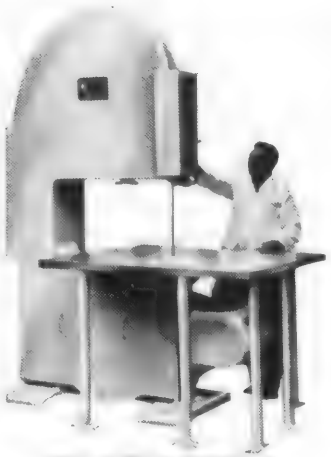

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I.S.I.S. is an organisation backed by a large industrial group of consultants with contacts in all the industries based on technology. As an addition to their present resources they have established this Appointments Register. Below will be found some of those technologists who are looking for further opportunities. Employers and Personnel Officers are invited to complete the form below, detach and send to the above address. In this particular instance the use of a form, with its attendant simplification of office systems, ensures speedier results for the employer.

Ref. B.562. British. Male. Married. Age 38. B.Sc.Eng., A.M.I.C.E. 5 yrs. Asst. Engr., civil engg. contractors. 1½ yrs. Asst. Engr., consulting engrs. 1 yr. Section Engr., consulting engrs. At present Contractors Agent, civil engg. contractor. Has taken courses on concrete roads, diving & hydrographical surveying. Seeks **TECH. ADMINISTRATION (CIVIL ENGG.)** post. U.K. £2,000 p.a.

Ref. B.564. British. Male. Married. Age 39. Studying for Management Dip. (Indust-1). 7 yrs. exper. all branches m/c shop practice & instrument prod. includg. progress & planning, TV & electronic instrument prod. & research. 3 yrs. Design D/man, TV & electronic instruments. 1 yr. Design D/man, radar equipt. 3½ yrs. Design D/man, elec. & electronic engrs. 6 yrs. Chief D/man/Asst. Gen. Manager, elec. & mech. consultants. At present Chief D/man Liaison Engr., measurement & control instruments. Exper. work to ministry specifications. Seeks post as **CHIEF D/MAN OR CONTROLLER OF RESEARCH OR PROD. DEPT.** London—central, S. or S.W. pref. £1,250 p.a.

Ref. B.565. British. Male. Married. Age 34. O.N.C. Elec. & Prod. H.N.C. Mech. & endorsements. Managemet & WS. A.M.I. Mech.E., A.M.I. Prod.E., A.M.B.I.M. Apprenticeship with engg. company. 4 yrs. Design D/man, prod. & design consultants. 2 yrs. Projects Engr., collapsible tubes & containers. 3 yrs. Factory Prod. Planning Engr., electro-mech. instruments. 3 yrs. Chief Prod. Engr., electric power tools. 1½ yrs. Works Manager, small tools & m/c tools. At present Genl. Works Manager, electric motors & electronics. Seeks post as **WORKS MANAGER, GENERAL MANAGER OR SIMILAR.** London pref. but Home Counties acceptable. £2,500/£3,000 p.a.

Ref. B.566. British. Male. Single. Age 35. O.N.C. Mech. Eng., Inter. C. & G. M/c Shop Eng. Languages: German, Italian, Polish, French. 1 yr. Elec. maintenance, sawmill. 1½ yrs. Elec. Wireman, German aircraft mnfrs. 1½ yrs. Heat Treatment work, German aircraft mnfr. 4 yrs. Manager, motor car dampers. At present Maintenance Manager, automatic laundries. Exper. supervision new plant, staff control, purchasing. Seeks **TECHNICAL LIAISON POST.** London based.

Ref. B.568. British. Male. Single. Age 30. H.N.C. Mech. At present Designer D/man, electro-mech. instruments for air navigation. Seeks post as **DESIGNER D/MAN.** S.W. London or Surrey. £1,100 p.a.

Ref. B.250. British. Male. Married. Age 46. Dip. Inst. Eng. Inspection .A.M.Inst.Eng. Inspection. 4 yrs. Apprentice, genl. engrs. 8 yrs. Toolroom Inspector, airframes company. 4 yrs. Chief Inspector, experimental engrs. 3 yrs. Foreman/Inspector, elec. switchgear engrs. 4 yrs. Chief Inspector experimental & prototype engrs. At present Liaison & Quality Engr., gas turbine fuel pump component machining. Seeks **TECHNICAL LIAISON OR EXPEDITING & REPRESENTATION APPOINTMENT.** U.K.—Midlands preferred—not London. £1,100 p.a. min.

Ref. B.294. British. Male. Married. Age 34. O.N.C., H.N.C. (Mech.). A.M.I. Mech.E. 4 yrs. Works Apprentice, gauge & tool makers, 4 yrs. Detail D/man, light m/c tool & optical instrument makers. 1½ yrs. Detail D/man, automobile & genl. light engrs. 1½ yrs. Design D/man, chem. & petroleum plant mnfrs. 5 yrs. Senr. Designer, design & devpt. engrs. (contract design office). At present Senior Designer (Mech.), mnfrs. oxygen cutting profiling m/cs. Seeks post as **ASST. CHIEF D/MAN, SECTION LEADER OR TECH. LIAISON ENGR.** Central London or Southern Home Counties. £1,250 p.a. approx.

Ref. B.266. British. Male. Married. Age 31. O.N.C. (Mech., Prod. & Marine), Grad.I.E.D. 4 yrs. Apprentice, petrol & oil pump & measuring equipt. 1 yr. D/man, oil company. At present D/man, air conditioning, heating & industl. paint finishing. Outside exper. on Plant installn. & testing. Seeks any **INTERESTING POST WITH PROSPECTS**—but not D/man. U.K., London or S. England pref. £1,000 p.a.

Ref. B.570. British. Male. Single. Age 22. O.N.C. (Mech.), H.N.C. (Inst.), M.Soc.Inst.Technology. 5 yrs. Apprentice & at present Tech. Sales Engr., industl. instrument mnfr. Seeks post as **INSTRUMENT ENGINEER.** London. £875 p.a.

Ref. B.571. British. Female. Single. Age 22. B.Sc. Botany with subsid. Chem. & Zoology. At present Asst. Science Teacher. Seeks **RESEARCH POST,** but would consider **ABSTRACTING/LIBRARY WORK.** U.K.—pref. London or Home Counties. £600 p.a.

Ref. B.572. British. Male. Single. Age 38. M.A. (Botany). 1 yr. Forestry work & 2 yrs. Grad. Research Worker, coal research. 5 yrs. Research worker, paint research. At present i/c preparation of exhibits, visits & training courses, research concern. Has taken a course in P.R. Seeks **PUBLIC RELATIONS/EXHIBITIONS POST.** London. £800-£1,000 p.a.

Ref. B.573. British. Male. Married. Age 35. 5 yrs. Section Ldr., aircraft mnfr. 1 yr. Office Manager, engrs. 1 yr. Flight Engr., airline. At present Asst. to Directors, engrs. Seeks **EXECUTIVE POST.** U.K. £1,200 p.a.

Ref. B.574. British. Male. Married. Age 34. H.N.C., A.M.I.Mech.E. Apprentice/Senr. Technician/Chief Technician, instrument makers. 3 yrs. Instrument Application Engr., instrument mnfrs. 1½ yrs. Devpt. work, automation engrs. At present Instrument Engr., instrument mnfrs. Consid. exper. lecturing & Training staff. Seeks post as **INSTRUMENT ENGINEER.** London. £1,400 p.a.

Ref. B.575. British. Male. Married. Age 31. H.N.C. (Chem.), Dip. Chem. Eng. 3 yrs. Plant Chemist, detergents, surfactants. 5 yrs. Prod. Chemist/Asst. Plant Manager, pharmaceuticals & fine organic chemicals. 6 mnths Research Consultant—chem. processing. At present Prod. Manager, chem. mnfrs. Exper. surface coatings, alkyl chemicals, oil additives, costing, budgeting & packaging. Seeks post as **PROD. MANAGER OR ASST./WORKS MANAGER.** U.K.—pref. S. England, but abroad considered. £1,450 p.a. min.

Ref. B.576. Nigerian. Male. Married. Age 33. **RESIDENT U.K.** H.N.D. (Structural Engg.). 1 yr. D/man, govt. work. 9 yrs. Eng. Asst. town council Africa. Just completed 3 yr. course at U.K. Tech. College. Exper. design & detailing of RC. steel, prestress & architectural draughting. Seeks post as **STRUCTURAL DETAILER.** London. £875 p.a. approx.

Ref. B.577. British. Male. Married. Age 32. Chem. to H.N.C. & Exemption Pts. A. & B. Inst. Chem. Eng. 4 yrs. Analytical Chemist, road material mnfr. 7 yrs. Analytical Chemist/Metallurgical Technician/Steelworks Shift Manager, steel mnfr. At present Process Controller, chem. mnfr. Interested high temperature chemistry & process equipt. Seeks **TECH. ADMIN./TECH. LIAISON POST** in chem. or metal processing. London or S. England. £1,400 p.a.

Ref. B.579. Indian. Male. Single. Age 24. **RESIDENT U.K.** B.E. (Civil), Grad. I. Struct. E. (London). 1 yr. Civil Engr., public works dept. 2 yrs. Design Engr., consulting civil engrs. & struct. designers. Good exper. R.C.C. & steel structures. Seeks post as **ASST. ENGR. OR DESIGNER/DETAILER.** London. £800 p.a.

(continued overleaf)

To: I.S.I.S. Appointments Register, 9, Eden Street, London, N.W.1. Please ask the following applicants to communicate with the undersigned:

Ref.:.....	**Ref.:**.....	**Ref.:**.....	**Ref.:**.....
Ref.:.....	**Ref.:**.....	**Ref.:**.....	**Ref.:**.....
Ref.:.....	**Ref.:**.....	**Ref.:**.....	**Ref.:**.....

Please use Block capitals

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Position: .....

Company:.....

Business or Profession: .....

Address: .....

All introductions are made on the understanding that should an engagement result the employer agrees to I.S.I.S. Appointments Register's terms, which are as follows:

For each person engaged the equivalent of two weeks salary payable by the employer within fourteen days of the date of engagement.

Signature..... Date.....

I.S.I.S. APPOINTMENTS REGISTER *(Continued from overleaf)*

Ref. B.580. British. Male. Married. Age 28. B.Sc., A.R.C.S.T., S.I.Chem.E. 2 yrs. Junr. Engr. (Site), heavy pressure vessel mnfrs. At present Tech. Service Engr., agents. Seeks post as **CHEM. ENGR.** U.K. (not London)—Scotland pref. £1,300 p.a. approx.

Ref. B.581. British. Male. Married. Age 40. H.N.C. (Chem.), subsid. Physics for A.R.I.C. Diploma in Commerce. 4 yrs. Process Control Chemist, commercial rare earth producer. 11 yrs. Analyst/Research Metallurgist/Group Pilot Plant Superintendent/2 i/c Commissioning Team/Company Plant Devpt. Metallurgist, copper & cobalt mines. At present Asst. Plant Superintendent, copper & cobalt mining group. Wide exper. extraction equipt., incldg. fluosolid, reactors, submerged evaporators, electrolysis, filters, dust extractors, complex hydro-metallurgical process. Seeks **PLANT MANAGEMENT OR PLANT DEVPT: POST.** U.K. £1,500 p.a. min.

Ref. B.582. British. Male. Married. Age 25. B.Sc. (Chem. Eng.). S.M.I.Chem.E. At present Chem. Engr. (operational Engr.), gas & chem. plant mnfr. Seeks post as **PROD. ENGR.** U.K.—not London—£900-£1,000 p.a.

Ref. B.583. British. Male. Single. Age 43. B.Sc. (Chem. Physics, Maths). Exper. includes 4 yrs. Chem. Asst, investigation atmospheric pollution, elec. generating board. At present Chem. Asst,. analysis coal, oil & water—elec. power station. Fluent French & German & some Spanish. Seeks post as **CHEMIST.** London or N. Kent. £1,000 p.a.

Ref. B.584. British. Male. Married. Age 35. B.Sc.(Eng.), A.M.I.Mech.E., A.F.R.Ae.S. 6 yrs. Post Grad. Trainee/Stressman/Asst. Section Leader, stress office, aircraft mnfrs. At present Project Design Engr., aircraft mnfr. Exper. structural design of components, planning, inspection & prod. devpt. Seeks post of **ADMINISTRATIVE STATUS.** £1,600 p.a. min.

Ref. B.585. British. Male. Single. Age 35. B.Sc. (Chem.), A.R.I.C., A.M.I.W.M., A.M.B.I.M. 4½ yrs. Lab. Asst., paint & varnish mnfr. 1½ yrs. Works Chemist, paint, varnish & cellulose lacquer mnfr. At present Chemist/Manager, paint & varnish mnfr. Knowledge plant & m/cy maintenance, jointing compounds, bituminous compositions, raw material buying, effluent & sewage disposal, oils & greases, bldg. methods & materials, costing, pricing & sales. Seeks **TECH. MANAGEMENT** post. England. £2,500 p.a.

Ref. B.586. Hungarian. Male. Single. Age 62. **RESIDENT U.K.** Chem. Engg. Degree. 4 yrs. Works Chemist, mnfr. rubber & plastic products. 16 yrs. Chief Chemist, electrolytic process of chlorine, liquid caustic & bleach. 8 mnths. Analytical Chemist, chem. spray mnfrs. At present engaged in testing work, prod. of lead storage batteries. Seeks **LABORATORY ANALYTICAL WORK.** London. £14 per week.

Ref. B.587. Ceylonese. Male. Married. Age 27. **RESIDENT U.K.** 3 yrs. Engg. Apprenticeship, R.A.F. Tech. Training School. 5 yrs. Tech. Supervisor, soap & edible fats. Seeks suitable **TECHNICAL POST.** London. £15 per week.

Ref. B.588. Indian. Male. Single. Age 24. **RESIDENT U.K.** Grad. Elec. Engg., S.I.Mech.E. 7 mnths. Junr. Engr., mnfrs. elec. motors & transformers. 1 yr. Sales Engr., distributors elec. m/cy. Has just completed post-grad. Dip. course in Industl. Admin. at U.K. Technical College. Seeks post in **ELEC. M/CY. CABLES OR SWITCHGEAR & CONTROL GEAR FIELDS.** U.K.

Ref. B.589. Indian. Male. Single. Age 32. At present Resident U.K. B.Sc.(India), B.Pharm. (London), M.P.S. 3 yrs. Apprentice Chemist/Chemist, pharm. & biological medicines mnfr. 6 mnths. Chemist, retail pharmacy. At present Chemist, pharmaceutical & cosmetic mnfr. Seeks post as **CHEMIST.** India.

Ref. B.590. British. Male. Married. Age 28. H.N.C.(Mech.Eng.). 5 yrs. Apprentice, oil refinery. 6 mnths. Assembler, generator instlln. 2 yrs. Bench Fitter, window mnfrs. 4 yrs. Senr. D/man, aircraft mnfr. At present Mech. D/man, chem. plant constructors. Seeks post as **MECH. D/MAN OR JUNR. ENGR.** Hemel Hempstead area. £1,100 p.a.

Ref. B.591. British. Male. Married. Age 46. B.Sc. (Chem. & Maths.), M.Inst.F. 5 yrs. Research work, synthetic fibres. 1 yr. Plant Manager, pigments. 9 yrs. Chief Chemist, coke ovens. 1½ yrs. Asst. Manager, chem. engrs. At present Tech. Sales Engr., chem. engrs. Wide exper. preparation of tenders, negotiations & genl. supervision of contracts to completion & acceptance, pilot plant work, export work for overseas contracts. Seeks **EXECUTIVE APPOINTMENT.** £2,500 p.a.

Ref. B.592. British. Male. Married. Age 42. B.Sc. (Zoology & Chem.), M.Sc. (Entomology). 6 yrs. Genl. Science Lecturer. 5 yrs. Senr. Research Entomologist, govt. agric. research dept. 2 yrs. Director, Agric. Research, overseas govt. 2 yrs. Head of Section, insecticide screening & testing. 1 yr. Inspector, pest survey—stored food products. At present Head, Entomological Survey Dept., growing & marketing of cotton. Author of many published technical articles, reviews & reports. Seeks **TECHNICAL/ADMIN/RESEARCH/WRITING** post—insecticide or allied trade. London or Home Counties. £1,000 p.a. approx.

Ref. B.593. British. Male. Married. Age 50. S.M.Soc.E. 6 mnths. Tech. Investigation, cocoa & rubber importers. 1½ yrs. Senr. Produce Officer, i/c pest control unit. 10½ yrs. Senr. Cocoa Officer, dept. of agric. 1 yr. Engr. i/c Plant, coast erosion project. At present Cocoa Officer/Agronomist, dept. of agric. Seeks **PEST CONTROL OR TECH. REPRESENTATIVE POST IN U.K.** or **PLANTING OR PLANTATION ADMIN. POST** in Malaya, Samoa, Br. Solomons, N. Borneo, New Guinea. £1,250 p.a.

Ref. B.594. British. Male. Married. Age 36. B.Sc. (Physics), A.Inst.P. At present Group Leader, electronic components, mnfr. radar equipt. Exper. responsibility for R. & D., prod., budget control & sales liaison. Seeks post as **DEVPT. OR PROD. MANAGER/INDUSTL. CONSULTANT/CHIEF ENGR.** London. £2,000 p.a.

Ref. B.595. Nigerian. Male. Single. Age 25. Resident U.K. Awaiting O.N.C. (Civil Eng.) result. 2 yrs. Trainee Designer/Detailer, civil engg. Seeks **CIVIL ENGG. POST** with day release for H.N.C. course. London. £560 p.a. min.

Ref. B.596. British. Male. Married. Age 49. M.I.E.E., M.B.I.M. 2 yrs. Engr., elec. components. 1 yr. Engr., TV devpt. 8 yrs. Works Manager, elec. components. 4 yrs. Devpt. Manager, elec. components. 8 yrs. Director & Genl. Manager, radio components. At present Works Manager, elec. & radio components. Wide business exper. Seeks post as **GENL. MANAGER.** London. £3,000 p.a.

Ref. B.597. British. Male. Married. Age 38. Inter. B.Sc. 2 yrs. Lab. Asst., govt. dept. 2 yrs. Asst. Chief Chemist, tarmac, asphalt & bitumen processors. 7 yrs. Chief Chemist, bitumen processors. At present Industrial Tech. Representative, suppliers to motor industry. Good knowledge motor industry methods & personnel. Seeks post as **TECHNICAL REPRESENTATIVE.** £1,600 p.a.

Ref. B.598. British. Male. Single. Age 20. O.N.C. (Chem.). At present Asst. Works Chemist, mnfrs. of natural & synthetic rubber & plastic compositions. Seeks post as **R. & D. CHEMIST,** with day release for H.N.C. course. London. £625 p.a.

Ref. B.599. British. Male. Married. Age 41. M.Inst.Ex.E. 10 yrs. Apprentice/Toolmaker, incl. Jig Boring & Jig & Tool Inspection. 1½ yrs. Jig & Tool D/man, hoisery m/c mnfr. 3½ yrs. Jig & Tool Designer, aircraft & industl. instruments. 2 yrs. Chief Tool Designer & Planning Engr., govt. contract work. 1 yr. Chief Mech. Engr., mech., elec. & electronics engrs. 6 yrs. Senr. Tool Designer, aircraft elec. mnfr. At present Senr. Prestool Designer, electronic, elec., mech. & aircraft equipt. Seeks post as **PROD. ENGR./TOOLING ENGR.** London area. £1,500 p.a. approx.

Ref. B. 600. British. Male. Married. Age 41. Dr. Phil. (Chem., Physics, Zoology), A.M.Tech.I. (Air Navigation, Mathematics). 3 yrs. Research Chemist, chemicals, plastics. 4 yrs. Civil Servant, Foreign Office. 5 yrs. Senr. Technical Representative, chemicals/plastics. At present Tech./Devpt. Executive, textiles & plastics. Good experience coated fabrics, export, liaison with ministries. Fluent German. Seeks post as **TECH. SALES MANAGER OR SIMILAR.** Pref. London. £2,250 p.a. min.

Ref. B.601. British. Male. Married. Age 36. Ph.D., B.Sc. (Physics) (1st Class Hons.). 4 yrs. Demonstration & Research work, university. 9 yrs. Industl. exper. includes Physicist & Devpt. D/O, mech. engg. & at present i/c R. & D. & Prod., electrical components. Exper. budget control, sales & client liaison, & some exper. nuclear & vacuum physics/techology. Holds several patents. Seeks post as **SCIENTIFIC ADMINISTRATION EXECUTIVE.** Central or N. London or N.W. Home Counties. £2,000 p.a. approx.

Ref. B.602. British. Male. Single. Age 47. B.Sc. (Chem., subsid. Physics), A.R.I.C., C. & G. Paint Technology (Advanced). 9 mnths. Lab. Asst., paint & varnish mnfr. 1½ yrs. Student Asst., elec. equipt. mnfr. 8½ yrs. Analytical Chemist, photographic goods mnfr. 5½ yrs. Chemist—genl. analytical & polymer research,—paint & varnish mnfr. 6 yrs. Experimental Officer, standard solutions & paint testing. At present Analytical Chemist, paint & varnish mnfr. Seeks post as **CHEMIST**—genl. analytical or resin research. S.W. Lancashire pref. but Yorkshire or Midlands considered. £850 p.a. min.

Ref. B.603. Nigerian. Male. Married. Age 29. **RESIDENT U.K.** H.N.C. (Bldg.). 5 yrs. Survey Asst., land surveyors. 2½ yrs. D/man/Designer, structural engr. At present D/man, RCC engrs. Studying for H.N.C. (Structures). Seeks **ENGG./SURVEYING** post. London. £15 per week.

Ref. B.604. British. Male. Single. Age 27. B.Sc. (Mech. Eng.), G.M.I.Mech.E. 2 yrs. Grad. Apprentice, precision electro-mech. engrs. At present Project Engr., Works Services organisation of govt. dept., covering mech. & elec. aspects of plant & housing. Seeks post as **PROJECT ENGR. OR TECH. SALES ENGR.** London area, Scotland, Scandinavia. £1,200 p.a.

Ref. B.605. British. Male. Single. Age 22. O.N.C. (Physics). Apprenticeship & at present Engr., elec. instruments & process controls. Seeks post as **ENGR., WITH DAY RELEASE** for H.N.C. course. London. £800 p.a.

Ref. B.606. British. Male. Married. Age 31. Grad. I.E.E. 6 yrs. Student Apprentice, steam engrs. 1 yr. Sea-going engr., ship owner. 7½ yrs. Control Engr./Asst. Charge Engr./Test & Efficiency Engr., steam engrs. At present Performance Engr., electricity generation. Knowledge boilers, turbines & condensers. Seeks post as **TEST ENGR.** (pref. mech. engg.). Norfolk or E. Anglia. £1,000/£1,200 p.a.

Ref. B.607. British. Male. Married. Age 24. H.N.C. (Chem.), A.P.I. 2 yrs. Lab. Asst., dyestuffs mnfrs. 4 yrs. Student Chemist/Chemist, motor mnfrs. At present Non Metals Chemist, motor mnfrs. Seeks post as **PLASTICS TECHNOLOGIST**—pref. in a Tech. Service Dept., with prospects of Tech. Service Representation. England—pref. N. £1,000 p.a.

Ref. B.609. British. Male. Married. Age 27. 3½ yrs. Apprentice, elec./light engg. 6 yrs. Plastic Moulder, & at present Asst. Prod. Manager, mnfrs. plastics (glass fibre). Has completed company management course & 1st yr. B.I.M. Seeks post as **ASST. WORKS MANAGER/ASST. PROD. MANAGER.** U.K. pref. but overseas considered. £1,200 p.a. approx.

Ref. B.611. British. Male. Married. Age 28. 6 yrs. Fitter, refractory brick mnfrs. 3 yrs. Fitter, steel mnfrs. 6 mnths. Salesman, washing m/cs. 1 yr. Mechanic, garage. At present Sales Representative, agric. & horticultural engrs. Seeks post as **REPRESENTATIVE**—pref. with engg. or motor firm. U.K.—pref. S. Yorkshire or Lancs. or Derbyshire. £650 p.a. min.

Ref. B.612. Indian. Male. Single. Age 28. **RESIDENT U.K.** B.Sc. (Chem. & Physics). Textile Cert. 3½ yrs. i/c automatic looms, Indian dyeing concern. 1 yr. Chemist, gypsum, lime & alabastine company in Canada. Has just completed 1 yr. Grad. Course in Polymer chemistry, U.K. Seeks post as **CHEM. ENGR.**—rubber/synthetic rubber. England. £800 p.a. approx.

Ref. B.185. British. Male. Married. Age 42. F.C.S., M.S.R., A.R.S.H., M.S.M.A., A.I.Inf.Sc. 3 yrs. Deputy Asst. Sales Manager/Sales Manager, Pharmaceuticals. 1 yr. P.A. to Medical Director, pharmaceuticals. 4 yrs. Representative/Senr. Reprensentative, pharmaceuticals. At present Sales Manager/Information Officer, pharmaceuticals & organic chemicals. Seeks post as **SALES MANAGER** London. £2,000 p.a. min.

Ref. B.438. British. Male. Married. Age 40. B.Sc. (Hons.) Eng., A.M.I.E.E. 3 yrs. Design Engr., carrier equipt. At present Senr. Project Engr., telecommunication equipt., responsible for projects from inception to first field installation. Consid. exper. liaison with equipt. & cable factories, sales & instlln. organisation, control & guidance of staff. **SEEKS POST,** not necessarily in carrier working or design, **MAKING USE OF PRACTICAL RATHER THAN THEORETICAL ABILITY.** £2,250 p.a. min.

Ref. B.446. British. Male. Married. Age 36. Inter.B.Sc. Chem., Applied Maths. C. & G. Leather mnfr. & dyeing certs. At present Experimental Officer/Dyestuff Technologist in Tech. Service Dept. of dyestuffs concern. Consid. exper. leather & fur dyes, use of pigments in paints & printing inks, evaluation of new products & competitive materials, technical liaison. Good knowledge electronics. Seeks **SUITABLE APPOINTMENT (NOT LEATHER TRADE)** in non-city area of N. England, Scotland or N. Ireland. £970 p.a. but pleasant surroundings more important than salary.

Ref. B.380. British. Male. Married. Age 35. B.Sc. (Forestry). 14 yrs. Forest Officer, forestry—govt. At present Personnel Officer—govt.—Ministry H.Q. Administration. Practical knowledge & keen interest in agriculture. Seeks **FORESTRY OR PERSONNEL ADMINISTRATION WORK.** U.K. —Scotland pref. £1,500 p.a. min.

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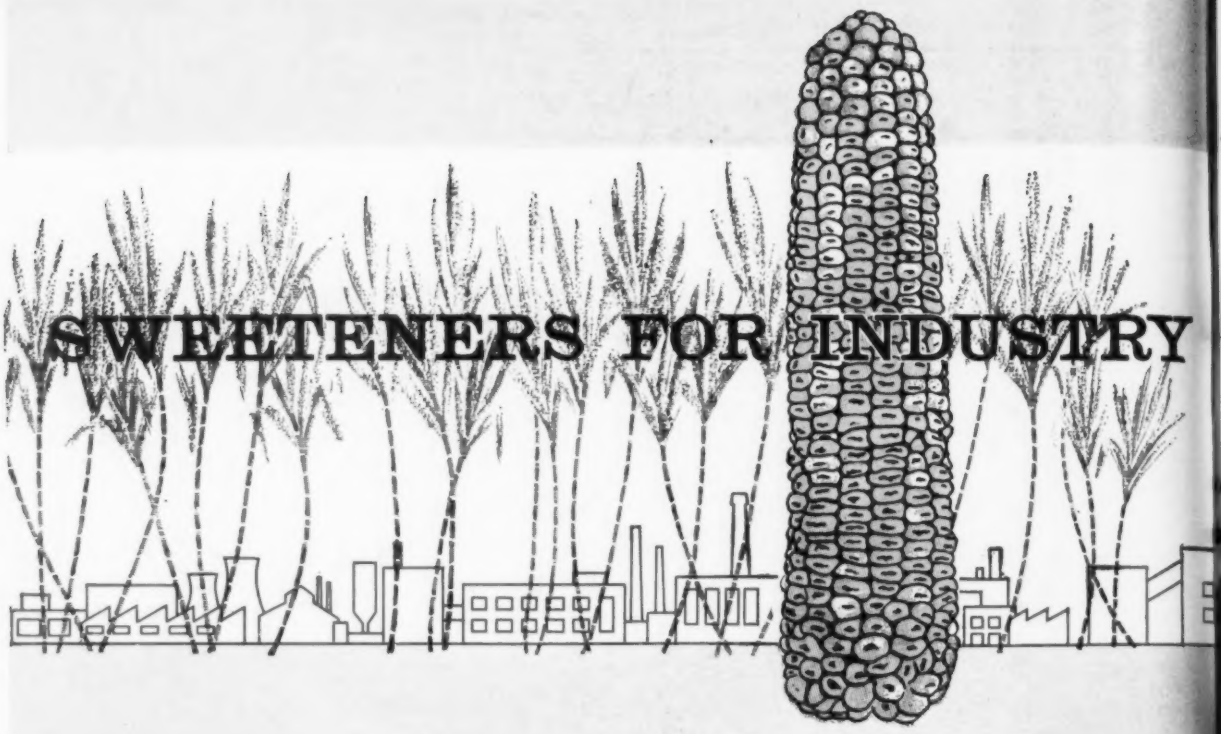

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